A SHORT TREATISE

CONCERNING SOME

PATENT INVENTIONS AND APPARATUS

FOR THE PRODUCTION OF

ICE, AND ARTIFICIAL COLD,

SODA WATER,

LEMONADE, NECTAR,

AND ALL

AERATED BEVERAGES

ALSO, THE NEWLY IMPROVED

ROTARY KNIFE CLEANING MACHINE,

AND

IMPROVED CULINARY UTENSILS;

BEING ALSO

A HAND-BOOK OF INSTRUCTION,

TO GUIDE THE UNINITIATED IN THE USES OF THE VARIOUS MACHINES, AND APPARATUS, ALSO IN THE PREPARATION OF CHOICE CONFECTIONS AND DELICATE COMPOUNDS.

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AND SOLD AT HIS DEPOT,

309, REGENT STREET, ADJOINING THE POLYTECHNIC;

333, OXFORD STREET;

AND 7, MANSION-HOUSE STREET, CITY

And by all Booksellers

London:

PRINTED AT THE PATENT JOURNAL PRINTING OFFICE,

89, CHANCERY LANE

1850

Price Five Shillings

PREFACE.

In introducing the present little work before the public notice I would beg to offer a few introductory remarks. I have for a considerable period paid great attention and devoted a considerable amount of time to the perfecting a few machines, having for their aim the simplification of a variety of culinary and other operations; the experiments attendant upon such a course have led me to remark a few curious results and startling effects produced under certain conditions, I have not before noticed,—these I have considered sufficiently interesting to make known;—but this is not the important point for which the following observations are intended.

The Ice Machine has now been in use—both in this country and others—for a period sufficient to render its nature known, and the efficacy of its operation evident to all. When I first produced that machine I accompanied it with a work called "The Ice Book," which, I am happy to say, met with general favour; one fact however soon after forced itself upon my understanding, that the matter contained was far too voluminous,—and perhaps not

enough so in those parts relating more directly to the machine and its uses. This book contained a number of valuable recipes for the preparation of Ices and Creams,—these I intend to embody in the present work, which I have endeavoured to render complete in information without troubling my readers with any unnecessary details beyond those requisite to render their understanding complete and simple.

Since the period above alluded to, not only have I considerably improved upon the construction of the Machine for Dessert Ices, &c., but I have also modified it for a number of highly useful purposes, which will hereafter be described.

I would also by the present pages notice some new inventions lately patented by me, so that the information contained herein may become important and useful for one and all of my machines,—and if made to answer the purpose for which it is intended, a companion by which all may become acquainted with their management and uses.

I must beg the indulgence of my readers to overlook any misappliances or misnomers which may result from an imperfect knowledge of the branches of science concerned, those portions of which bearing immediately upon the action of these contrivances, I have endeavoured to render intelligible, perfectly aware, however, of their more able and simple elucidation in other works.

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CHAPTER I.

HEAT AND COLD.

ALL subjects require a commencement to lead us carefully to consider their matter, and investigate their values; not a commencement only is required, —something more is necessary,—that something is generally comprised in a knowledge or understanding of the theme before our notice; by which knowledge we are led to ascertain the why and the wherefore of those results, which might otherwise astonish us, and which mostly end only in such feeling of wonderment and surprise. These remarks have emanated from careful observation of such feelings, and from an understanding of the proneness of human nature to perceive beyond itself (regarding those results not immediately within the range of present comprehension), the too frequent dismissal of such subjects without inquiry, satisfying ourselves without reason. Thus many beautiful facts have been lost sight of, many valuable inventions dis-

regarded, for want of inquiry, and the too generally prevalent "dogma" of our minds, that all not immediately within our own ideas of consummation "is impossible;" this leads us frequently, and unfortunately into error. Let us, therefore, learn a few facts in connection with a subject not altogether foreign to the above remarks. How many are there, if told that a machine had been constructed that would immediately convert boiling water into ice, even if placed upon the fire, would immediately say "impossible! I am quite sure that cannot be," and such like expressions,—shutting their understandings at once against the information, and deeming it, without inquiry, too foolish to require a moment's consideration. Yet such things are, and the above fact is far removed from anything like impossibility, not even labouring under the difficulty offered by absence of practice. Here theory has pointed out the fact, and practice effectually demonstrates the same. We are about offering a few remarks upon such a subject, upon a simple apparatus, by aid of which ice may be produced, under seeming impossibilities, and with remarkable facility and ease. Let us inquire, first of all—What is ice? We may say, a true luxury to human beings, a priceless delicacy in many instances; and only those who have suffered the enervating effects of warm climates, and the residents of such countries can understand how great the comfort and enjoyment gained, in the possession of any means of counteracting the effect of such atmospheres.

Ice is congealed water—water in its most simple state—water that has parted with a considerable portion of heat, a quantity sufficient to prevent its continuance any longer in the liquid condition. The existence of all the states of water, in their peculiar forms, are dependant upon heat. Lessen the amount of that agent, bodies contract, become more dense, increase its quantity, and the capacity of the body is increased also; so we may conclude (as is the case), that "cold" is dependant upon heat,—in fact, that the more dense a body becomes, the less heat it contains, and therefore it becomes "cold," that cold, like heat, varies in intensity. The term "cold," however, should not be thus indefinitely used; it is, after all, but a conventional phrase, a negation—it is merely the absence of heat. If I rob a body of the heat it already contains, the conditions of the intensity of that agent in such bodies are altered. The negative result we have, among ourselves, agreed to designate "cold." Cold however, we must remember, is only an inferior intensity of heat. "Cold as ice."—We all are apt to employ such expressions, often imagining thereby that ice contains no heat; on the contrary, it does, and that too in considerable quantities. This may be better understood from the following circumstances. If we introduce a portion of ice into a room or atmosphere reduced in temperature beyond itself, it will immediately commence radiating its heat, in order to restore an equilibrium between itself and the surrounding medium. A thermometer in proximation

with a piece of ice under such conditions, would immediately indicate an increase of temperature, and although ice has been, and is now sometimes, regarded as the intensity of cold, yet there is no knowing to what extent the abstraction of heat could be carried, had we facilities for fully completing such a purpose. In the present day, science furnishes us with numerous instances, where cold may be produced of an intensity far beyond ice, capable of solidifying many substances, until very lately only known as existing either in the liquid or gaseous state. Ice, therefore, is merely the temperature at which water solidifies, and not by any means to be considered as the extremity of cold; for we shall presently show that such a degree of cold may be produced without ice, that water immediately becomes frozen, the materials themselves, however, producing such cold remaining in the liquid condition, thus proving their requirement for congelation of an intensity of cold much beyond the freezing point of water. Ice is a transparent body; when however, the process of solidification, under the influence of diminished temperature, is extremely rapid, ice becomes opaque, and assumes a more opal appearance. This is owing to certain circumstances to be hereafter noticed. The only peculiar property to which we shall here revert connected with ice, is its expansion during the process of congelation, an effect, at first sight, contrary to all the known laws of nature; commonly we might understand, and also, from our previous remarks, conclude,

that as water assumed a denser condition, it would become specifically heavier than when in its previous liquid state. Theory would justly lead us to the same conviction; practice, however, points out the seeming exception here, and shows that, instead of contracting, water expands under the influence of cold. During the process of solidification, water continues contracting down to a temperature 40° 5″; when at that point, expansion commences. From this fact we learn that water becomes of less specific gravity, whether it be heated above or cooled below 40° 5″—a fact too astonishing and seeming anomalous ever to have been discovered or imagined from inductive reasoning. Let us consider the importance of such a law, and the probable results, had not such existed. Had water, like other fluids in general, become specifically heavier as the process of cooling continued, the most deplorable effects would have followed in winter, when the water became frozen on the surface of our rivers, lakes, &c.; it would have sank as it became so. Another surface of water would in like manner have frozen, and fallen to the bottom; eventually, as the process of congelation continued, the whole mass would have become an immense block of ice, and the beds of rivers, and other large bodies of water, mere repositories for that material; and as water does not conduct heat, it never could again become liquified,—the succeeding summer's heat would have little effect in unbinding the immensity which would be presented by all waters as a frozen chaos. How lamentable a result

would have followed. Fishes, and the inhabitants of the sub-aqueous world, could no longer exist; and the picturesque scenery of our beautiful rivers would have become converted into a cold and cheerless waste. Here, indeed, have we presented to our understanding, unmistakeable evidence of the wisdom of an all-powerful Being. How admirable the wisdom! How skilful the contrivance that, by subjecting the water to a contrary law to that usually observed in other fluids, the water, as it freezes, becomes specifically lighter; and thus swimming upon the surface of the subjacent fluid, performs an important service—protecting the under medium from the cooling influence of the surrounding air; ready, however, in its turn, to absorb its own accustomed quantity of heat, upon the first favourable change of the atmosphere. Thus, by an all-wise Providence, are the inhabitants of the sub-aqueous portions of our globe cared for, and preserved in their usual comfort and integrity. Not only they, but we, one and all, must readily acknowledge the great blessing we ourselves derive from such a combination of circumstances. Watts has beautifully conveyed the knowledge of such seeming disturbances of Nature's laws in the following simple strain:—

> "Nature compelled by a superior cause,
> Now breaks her own eternal laws;
> Now seems to break them, and obeys
> Her Sovereign King in different ways."

During the freezing process, water expands! How is this seeming anomaly to be accounted

for? Some philosophers have attempted to account for it in one way, some in another. One very plausible theory proclaimed the effect to be owing to air bubbles. Of this, however, we are assured that during the congelatory operation ice assumes a crystalline condition, composed of filaments which are found to be joined at an angle of 60°. Chemists have termed this (perhaps inaptly) "polarization;" and now state that ice assumes a polarized condition. In this condition it requires a much larger amount of room; expands, and thus becomes specifically lighter than the surrounding fluid. The force exerted during the crystallization of water is enormous. We say of steam, that when confined it is much more powerful than gunpowder. The same remarks may as correctly apply to water undergoing the freezing process, and similarly situate. Rocks, trees, and even bombshells are rent asunder by its expansive force; and it has been calculated that a spherule of water, only one inch in diameter, expands in freezing with a force superior to the resistance of 13½ tons weight. Bombshells have been rent asunder, and missiles driven to considerable distances, by this curious, yet powerful agent. In Russia, it is the only means employed to destroy old bombshells; and water is the compound employed in many of our own works, where vessels are required to be rent asunder. These are filled with water, plugged, and exposed to the influence of cold. The formation of ice plays an important part in the comminution of rocks (forming soils), flowing into the various crevices;

it there remains until the cold is sufficiently great, when, in freezing, it expands, splitting and rending the rock asunder. Illustrative of the immensity of power exerted during the expansion of water in freezing, I may here mention a circumstance occurring in my own experimental career. A gentleman from Russia, was about applying a plan for preventing the freezing of water in connection with railroads, and furnished me with an apparatus in order to test his means. The vessel, a stout iron one, was provided with an inner cylinder for containing water, space being left between the two vessels for placing the non-conducting material he proposed to employ for resisting the intensity of cold. The result—which, from previous experience, I had anticipated—was the entire demolition of the apparatus. The inner vessel was filled with water, and carefully surrounded with non-conducting materials, the whole being protected from immediate connection with any exterior application of cold. The apparatus was then immersed in a quantity of my freezing mixture, and allowed to remain. Our next visit discovered it rent and torn to pieces; the ice, in this instance, taken from the interior, presenting a beautiful transparent appearance. Ice is also extremely hard, resisting the influence of the finest tools. This property led the Russians to construct a palace of ice on the Neva; the decorations, furniture, &c., being composed of the same material. Cannons were also manufactured of ice, and were fired several times without bursting.

CHAPTER II.

HISTORY OF ICE AND COOLING MIXTURES.

THE history of ice is somewhat vague, and is deficient (as far as regards its artificial production,) in that precision which marks the general run of discoveries of such a nature. We first notice the mention of ice used as a luxury and a medicine, *and in order to show the errors of the ancients, we quote from* the fifty-first aphorism of the second section of Hippocrates, a celebrated physician, a native of the island of Cos, in the Ægean Sea, now the Archipelago, this notice occurred about four hundred and sixty years before Christ, and runs as follows: —"It is dangerous to heat, cool, or make a commotion all of a sudden in the body,—let it be done which way it may,—because anything that is excessive is an enemy to nature. Why should any one run the hazard, in the heat of summer, of drinking of iced waters, which are excessively cold, and suddenly throwing the body into a different state than it was before, producing thereby

many ill effects. But for all this, people will not take warning,—and most men would rather run the hazard of their lives or health, than be deprived of the pleasure of drinking out of ice." There is an account of one of the Ptolemies having given an entertainment, at the island of Elephantine, to his nobles, served in double vessels, lined with ice, obtained from the mountains in the neighbourhood. That the Romans, during the empire, regarded ice and snow as essential to both luxury and health, may be seen from the expression—"Nivatæ potiones," which shows that cool drinks were in general esteem;—and Martial also makes use of the phrase—"Nivarum colum," or snow strainer. Spain has long been celebrated for ice,—in fact, the nature of the climate almost requires such a necessary, on account of the heat, and the languor thereby occasioned. The body, after having endured fourteen or fifteen hours' sun, requires some stimulant, or rather cooler, to prepare it to undergo the fatigues of the following day. The Italians also use quantities of ice. Pisanellus states that before the use of ice was introduced into Sicily, the natives, living in a very hot air, were every year liable to malignant fevers, which swept away numbers of people; and we are assured that these fevers ceased upon the use of ice being introduced among them, after which there died one thousand people less (amongst them,) every year than before, in the town of Messina; and this gave occasion, even for the common people, to lay up every year

their store of ice, that they might be kept from those diseases they were subject to before, as much as they did bread and wine. Numerous processes have been resorted to for the production of artificial ice;—among them are the processes of evaporation and solution,—all, however, depending upon the passage of a substance or substances to a condition more expanded than that which they before occupied. It is a general law, that all bodies passing from a solid to a liquid form, produce a large amount of cold; as also do liquids passing from such liquidity to the gaseous condition;—because, all bodies being dependent for their peculiar state upon the amount of heat contained amongst their particles. It necessarily follows that any alteration among such must be entirely owing to the disturbance of heat. To exist in a liquid condition, a substance requires very much more heat than to exist in a solid state,—and to attain such, will rob all surrounding bodies of their heat, and thus considerably reduce them in temperature; so also, owing to the same reason, liquids passing into a state of gas or vapour, produce a considerable degree of cold. The practice of cooling fluids is of very ancient date,—and we read in many works of the means which were employed, principally depending upon the amount of cold produced by evaporation. It was a common practice to boil water, and expose it for a considerable time to the open air, occasionally moistening the exterior surface of the jar. The process of boiling the

water was for a long time considered as the principal cause;—this, however, had merely the effect of expelling the air from the water, and causing it much sooner to congeal. Such a practice is still pursued in India, where vessels are constructed of porous earthenware; these are filled with water, and kept constantly moistened on their exterior. Evaporation continues so rapidly (owing to the heat of the air) that the water contained within is quickly robbed of so much heat as to reduce its temperature to the freezing point; a crust of ice soon forms, which is carefully removed, and preserved for future use, in receptacles prepared for the purpose. Singularly enough, the success of this mode depends entirely upon the heat of the air, and it succeeds most fully when carried on in an atmosphere of rather high temperature. Heated air has a greater capacity for water than cold air, for the nearer we approach the congealing point of water, the less calculated is the air for carrying on the process of spontaneous evaporation. The entire success of this plan, in such situations as we have mentioned, is due to the augmentation in temperature of the atmospheres peculiar to such climes, and the increased capacity that such have for holding in suspension the vapour of water. Anomalous as the following statement may appear, yet it is easily possible "to freeze a man in the midst of summer," by merely pouring ether over him,—the experiment (if such it can be termed,) succeeding better as the atmosphere

is warmer. By aid of the same liquid, water may be soon converted into Ice, all of which effects are dependent upon the passage of matter from one condition to another more rarified. The water passes off as steam — the ether, as gas or vapour; to do so, they require much more heat than they previously possessed; therefore, they rob those bodies with which they may come in contact of their heat, and greatly reduce them in temperature. Water, by its own evaporation, is speedily frozen, if it be placed in a condition to cause such process to proceed quickly,—as when we boil water in an exhausted receiver of an air-pump, provided with some compound to absorb the vapour as soon as formed. With more volatile bodies, similar effects are produced of much more astonishing character; thus, by the aid of liquid sulphurous acid, water may be frozen in a red-hot vessel, the result depending entirely upon the rapidity with which the liquid acid passes off into gas. Carbonic acid may also be rendered solid by a like condition of circumstances,—detailed more fully in an after portion of our work.

The fact of cooling fluids by placing them in contact with water in which salts are undergoing the process of solution is, perhaps, of much more recent date than that of evaporation, and was first noticed in connection with "saltpetre," about the sixteenth century; but even then, it was not known that all salts possess this property in common, (in a greater or less degree); this is, however, no argu-

ment that the process itself is not of more ancient date, but merely the conclusion we may arrive at, having no record by which we might learn any such facts, had they been previously attempted. The Italians seem to have been the first to take advantage of this discovery, and employed saltpetre most extensively in cooling wines, &c. More recently, Lord Bacon mentions the great amount of cold that may be produced by mixing saltpetre and common salt with ice or snow. At the close of the last century, the French introduced the practice of congealing by such means, all kinds of pleasant-tasted juices. Eventually, an Italian of Florence conceived the novel idea of converting Lemonade into Ice, and so important an article did this become, that the manufacturers of it established themselves as a body called "Limonadiers," and were protected by a Royal Patent. The knowledge and uses of chemical salts in the process of cooling, has since then been rapidly extending. Experiments have been tried upon a variety of mixtures, chiefly by the Society of Petersburgh, and by our own countryman, Mr. Walker, of Cambridge. The inquiries of the latter gentleman have afforded a variety of mixtures to be employed, some of which produce, while undergoing liquifaction, an intensity of cold until then unknown. Thus, common salt and snow, or ice, mixed together, reduce the temperature to 0° Fah., and this, at one time, was imagined to be the utmost intensity of cold. By similar admixtures of salts in various proportions, and diluted acids, a much greater

reduction of temperature can be produced. In many instances, however, the employment of acids is very inconvenient, and may, if not properly managed, produce considerable disappointment. I will here relate a circumstance connected with my own experience. A very common freezing mixture, and one generally found in books, is "Sulphate of Soda," and "Dilute Sulphuric Acid." A friend of mine, being acquainted with this receipt, and wishing to cool some wine for the entertainment of his friends, carefully placed it in a tub, with the requisite quantity af acid and sulphate of soda, not forgetting the after-addition of water for the purpose of diluting the former compound. Judge the astonishment and surprise he experienced upon finding the corks leaving the bottles, and his wine speedily at a boiling temperature! Carefully as he had contrived his mixture, he had quite forgotten to dilute his acid in the first instance, and allow it to cool previously to using for cooling purposes, by which mistake, a most powerful degree of heat had been produced, sufficient, in this instance, to boil, instead of freeze the wine placed in it. By adverting to this experiment, we may very well illustrate the two conditions termed "Heat and Cold." Bodies passing into a more expanded condition, we have said, produce cold; the converse of this also holds good for bodies assuming a condition more dense than that of their previous occupation, produce a large amount of heat. The sulphuric acid and water, when mixed together, afford a good illustration of the last proposition, a

large amount of heat is liberated or set free, and becomes sensibly evident; this is entirely owing to the water, which, in combining with the acid, acquires a more dense existence — condensation ensues. The whole amount of heat previously required for the fluidity of the water is no longer necessary, it is given out, and thus increases the temperature of surrounding bodies; this fact, as we shall hereafter explain, has been taken advantage of for the attainment of warmth and comfort in travelling.

The slaking of lime, is also a well remembered fact, and our commonly conceived opinion is, that the heat produced by such admixture, is entirely owing to the lime. We say, "what a hot, burning substance is lime;" whereas, it is the very opposite, and during slaking, does not give off any of its heat, the whole increase of sensible temperature being set free from the water, which (as in the last instance) no longer requires the heat necessary for fluidity; it therefore parts with it, producing the peculiar effect we have here noticed.

To return to our experiment:—If we allow the diluted acid to cool, and then intermix it with sulphate of soda, heat is no longer an effect, but a large amount of cold is produced, because the conditions existing in our first proposition are present; the salt commences the process of solution, which process requires a greater amount of heat (in order to the existence of such salt in fluidity), its capacity for heat is enlarged—it seeks

the requisite quantity from all surrounding objects, these being robbed of their full amount, become reduced in temperature, and assume an inferior condition of heat, which we designate cold. So we find by one and the same process (in different stages), we first of all gain a degree of heat quite sufficient for all ordinary purposes, and an amount of cold capable of converting water into ice. This brings to mind a few remarks applicable to the use of all such cooling mixtures, and requiring for their perfect and most successful operation to be well understood. The cooling power of different substances undergoing solution may be represented by various relative quantities, according to their power of absorbing heat; and from a long series of experiments, I have at length prepared a compound capable of accomplishing this effect, to a much greater degree than any previous known mixture; still, however, let it be understood, I do not pronounce it a specific against any uncommon positions. Let the cooling influence of my salts be represented by 100°, in this condition they are capable of reducing water from a temperature 132° to the point of congelation; but the same charge of salt would not reduce boiling water to a like condition, unless the charge be again repeated. Thus the same quantity of salt (represented by 100°), would reduce boiling water to a temperature of 112°; and a second charge being placed in the room of that now exhausted would infallibly convert the previous boiling water into ice; therefore, it is a desideratum, in all

cooling processes, to have the liquids to be congealed as cool as possible, in order to facilitate the operation of congelation; still, by repeated quantities of freezing mixture, any substance may be reduced from any point down to 32°, the freezing point of water, the point of its conversion into ice, and even much beyond that. I have thought these latter remarks necessary, because persons have imagined that the machine and its appurtenances, once charged, would convert any substance, boiling or otherwise, into ice. We understand now, from the previous remarks, that this can only take place under such circumstances as when the amount of heat contained in the substance, above its congealing point, is equal to, or less than, the absorbing power of the salts; if it be greater, then a second quantity is necessary.

Having thus briefly, and I hope simply, endeavoured to place my readers in possession of the main facts, in connexion with the history and principles of my ice machines, I will now proceed to illustrate their various modifications, their uses, and their *modus operandi.*

FREEZING MIXTURES

WITH ICE OR SNOW.

	Mixtures.	Parts.	Thermometer sinks.		Degree of cold produced.
1	Pounded Ice or Snow	3	From any Temperature	to	32°
	Common Salt	1			
2	Pounded Ice or Snow	3		to	32°
	Soda	1			
3	Snow or Pounded Ice	2		to	5°
	Muriate of Soda	1			
4	Snow or Pounded Ice	5		to	12°
	Muriate of Soda	2			
	Muriate of Ammonia	1			
5	Snow or Pounded Ice	24		to	18°
	Muriate of Soda	10			
	Muriate of Ammonia	5			
	Nitrate of Potash	5			
6	Snow or Pounded Ice	12		to	25°
	Muriate of Ammonia	5			
	Muriate of Soda	5			
7	Snow	3	From + 32°	to — 23°	= 55°
	Diluted Sulphuric Acid	2			
8	Snow	8	From + 32°	to — 27°	= 59°
	Muriatic Acid	5			
9	Snow	7	From + 32°	to — 30°	= 62°
	Diluted Nitric Acid	4			
10	Snow	4	From + 32°	to — 40°	= 72°
	Muriate of Lime	5			

FREEZING MIXTURES WITH ICE OR SNOW—(continued.)

	Mixtures.	Parts.	Thermometer sinks.	Degree of cold produced.
11	Snow	2	From + 32° to — 50°	= 82°
	Cryst. Muriate of Lime	3		
12	Snow	3	From + 32° to — 51°	= 83°
	Potash	4		
13	Snow	3	From + 0° to — 46°	= 46°
	Diluted Nitric Acid	2		
14	Snow	8	From + 10° to — 56°	= 46°
	Diluted Sulphuric Acid	3		
	Diluted Nitric Acid	3		
15	Snow	1	From + 20° to — 60°	= 40°
	Diluted Sulphuric Acid	1		
16	Snow	3	From + 20° to — 43°	= 63°
	Muriate of Lime	4		
17	Snow	3	From + 10° to — 54°	= 44°
	Muriate of Lime	4		
18	Snow	2	From + 15° to — 68°	= 53°
	Muriate of Lime	3		
19	Snow	1	From + 0° to — 66°	= 66°
	Cryst. Muriate of Lime	2		
20	Snow	1	From + 40° to — 73°	= 33°
	Cryst. Muriate of Lime	3		
21	Snow	8	From + 68° to — 91°	= 23°
	Diluted Sulphuric Acid	10		

FREEZING MIXTURES

WITHOUT ICE.

	Mixtures.	Parts.	Thermometer sinks.	Degree of cold produced
1	Muriate of Ammonia	5	From + 50° to + 10°	= 40°
	Nitrate of Potash	5		
	Water	16		
2	Muriate of Ammonia	5	From + 50° to — 4°	= 46°
	Nitrate of Potash	5		
	Sulphate of Soda	8		
	Water	16		
3	Nitrate of Ammonia	1	From + 50° to — 7°	= 57°
	Carbonate of Soda	1		
	Water	1		
4	Water	1	From + 50° to — 4°	= 16°
	Nitrate of Ammonia	1		
5	Sulphate of Soda	3	From + 50° to — 3°	= 53°
	Diluted Nitric Acid	2		
6	Sulphate of Soda	6	From + 50° to — 10°	= 60°
	Muriate of Ammonia	4		
	Nitrate of Potash	2		
	Diluted Nitric Acid	4		
7	Sulphate of Soda	6	From + 50° to — 14°	= 64°
	Nitrate of Ammonia	5		
	Diluted Nitric Acid	4		
8	Phosphate of Soda	9	From + 50° to — 12°	= 62°
	Diluted Nitric Acid	4		

FREEZING MIXTURES WITHOUT ICE—(continued.)

	Mixtures.	Parts.	Thermometer sinks.	Degree of cold produced.
9	Phosphate of Soda	9	From + 50° to — 21°	= 71
	Nitrate of Ammonia	6		
	Diluted Nitric Acid	4		
10	Sulphate of Soda	8	From + 50° to — 0°	= 50°
	Muriatic Acid	5		
11	Sulphate of Soda	5	From + 50° to — 3°	= 47°
	Diluted Sulphuric Acid	4		
12	Pulverized Hydrochlorate of Ammonia	5	From + 50° to — 10°	= 60°
	Nitrate of Potash	5		
	Water	16		
13	Sulphate of Soda	5	From + 50° to — 3°	= 17°
	Diluted Sulphuric Acid	4		
14	Sulphate of Soda	6	From + 50° to — 10°	= 60°
	Hydrochl. of Ammonia	4		
	Nitrate of Potash	2		
	Diluted Nitric Acid	4		
15	Phosphate of Soda	3		
	Pulverized Sal Ammonia	2		
	Saltpetre	1		
	Diluted Aquafortis	2		
	Water	1		

The patentee always taking great care in the manufacture of the Freezing Mixture sold by him, strongly recommends all parties using his Machines to apply to him for the Mixture, which he warrants will keep in hot or any other climate.

Price 28s. per cwt., or £27 per ton.

CHAPTER III.

THE PATENT ICE MACHINE AND ITS VARIOUS MODIFICATIONS.

BEFORE giving a detailed description of the ice machine, and its various modifications, used in this patent process, it will be as well to mention a few of the prominent advantages it possesses, and of which all former plans were destitute. All who are acquainted with the peculiarities of dessert ices, must be aware that their delicacy depends (as far as regards the iceing portion in their process of preparation), upon the degree of fineness and smoothness given them during the time of congelation, for unless the "beating up" operation (as it is termed) be continued almost incessantly, the aqueous portion of the confection separates from the rest, and in this state becomes solidified. The operation mentioned has hitherto depended entirely upon the dexterity of the manufacturer, and is at all times a tedious process; in fact, one that can scarcely ever be accomplished by hand with any degree of certainty.

Therefore it often happens, that the compounds employed in the preparation of dessert ices, although of the most choice and delicate kind, are entirely spoilt during freezing, it being quite impossible to effect their perfect admixture without the aid of this machinery. The advantages of this machine may be comparatively understood from the following facts :—It is entirely deficient in those complexities inseparable from all former machines employed for a like purpose, as also the difficulty attending all previous operations with such when completed. The fine and homogenous character of the article produced surpasses all that can possibly be accomplished by hand, and its extreme simplicity is such, that the management and operations of the machine may be conducted by any person, however inexperienced, after once having received a few simple directions, such as are herein contained. Lastly, and not the least important property, is its great economy,—in this respect, far surpassing all other operations carried on for a like purpose. This fact, coupled with its portable nature, and ornamental appearance, has rendered its employment general,

Plate 1.



The Patent Freezing and Cooling Machine, as ready for action. The lower part, represented as open, contains a wine cooler, into which the freezing mixture passes.

and, I am happy to say, it has hitherto met with universal approbation.

Plate 1 represents a single motion patent ice machine. It consists of the outer case, forming a cellaret or wine cooler below, whilst the upper division contains the necessary apparatus for the operation of freezing. This is caused to revolve, by means of the handle attached to the side, B, connection being preserved as is usual in such portions of machinery. The freezing chamber contains a freezer, made of pure white metal, into which is introduced the dessert ice to be congealed. This, during the operation, is kept continually beaten up and agitated, by means of the spatula, seen at C, which is kept stationary, whilst the freezer itself is made rapidly to revolve. On the outside of the freezer is left a space for the freezing mixture, with which it is to be completely filled; the exterior boundary of such space is formed by introducing a metallic cylinder, nearly filled with *pure spring water;* the whole being surrounded by the exterior case, and protected as much as possible from the influence of conduction and radiation, by means of non-conducting materials, properly selected and disposed. The management of the machine is conducted as follows:—The metallic cylinder just alluded to is nearly filled with pure spring water, covered over, and returned to its position in the machine. The freezer to contain the dessert ice is then placed upon the lower spindle, which causes it to revolve, (with the cover on), in order

that no foreign matter may be inadvertently allowed to enter, and injure the taste of the article to be produced. The freezing mixture is next made to fill the space between the freezer and the metallic case. The usual quantities of my freezing mixture and water required for such a machine as now described (as well as others not made use of) are fully stated in specific directions forwarded with each machine. If ice and salt be employed for the purpose, it must be well rammed down all round. A few turns given to the machine at this juncture will cause the mixture, which gradually dissolves, to sink, when more must be added, until it is of an equal height to the water in the metallic case, and the cream, &c., you intend to freeze, care being taken to press it down as close as possible. The next operation is to pour the cream or water ices in the inner and revolving chamber or freezer, and to insert the spatula. The covers being now replaced in their original situation, it only remains to secure the spatula in a stationary position, by means of the rod passing through its handle, and screwing into either lug of the pail, and to communicate the necessary rotatory motion to the various portions of the machine. The revolving motion thus given to the freezer, causes the freezing mixture to more quickly act upon it and its contents; while the instant the latter becomes frozen to the sides, it is removed by the fixed spatula in the interior. This produces a fine flaky appearance, and keeps the whole substance

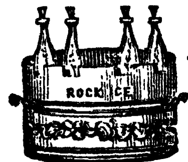
in a complete state of agitation; thus preventing the ingredients separating one from the other. The effect thus produced in an incredibly short space of time (three or four minutes only being required) in the quality and character of the ices is truly astonishing, and such as could hardly be expected. The charging of the machine, although exceedingly simple, is all important to the success of the operation. We think it therefore necessary to impress upon our readers how much on this depends. If it be not effectually accomplished, in nine cases out of ten the operation will be imperfect, or too rapid in its completion. The ice and salt, therefore, if employed as previously stated, must be well crushed and rammed down, so as to press as closely as possible on the freezer and metallic case; not forgetting a few turns to the wheel, that an equal portion of frost may be diffused throughout the whole amount of surface presented to the influence of the mixture; otherwise blame may be attached to the machine, when in truth it rests entirely with the operator. When the cream or other materials are frozen, they may be removed, or served in glasses or saucers from the machine; the case containing the spring water being allowed to remain for about an hour, or three-quarters of an hour, according to the surrounding temperature,—during which time it will become solid, without any further motion communicated to the wheel,—although agitation would promote congelation. The ices may be also pre-

served in this machine, so long as the freezing power is kept up; they may also be placed in moulds of any shape, immersed in ice and common salt, and thus kept for any length of time in a frozen state. The machine may be charged also without the dessert ice, or without the spring water, when the water in the metallic case is alone required to be frozen. In this case it may remain during the necessary period for congelation, it only being necessary to draw off about three-fourths of the soluble portion by means of the tap, before recharging, (into a vessel or cooler below, used for cooling wines); the freezing mixture is firmly pressed down, and the original quantity again made up. The cylinders for containing the spring water are generally manufactured of an ornamental shape, somewhat resembling a turret, the form being thus communicated to the frozen contents. When it is turned out of the case, it may be used as a wine-cooler, or as an ornament to the room, spreading an agreeable atmosphere around. By a very little attention, these blocks may be beautifully decorated with fruits or flowers, which must be inserted at the commencement of the freezing process, with a small portion of water only, and a few articles, such as green leaves, fruit, &c., according to pleasure; or the water may itself be flavoured with a liqueur for consumption. When this portion of water has become frozen, introduce more of the ornaments, and more water, and so on until the case is com-

pletely filled. Should this plan be neglected, and the whole quantity of water and ornaments placed in at once, the ornaments would not be equally diffused, but would be found collected in one part, according as they had disposed themselves. The form of almost all substances may thus be preserved entire and uninjured in the ice. When it is desired to remove the block from the metallic case, the vessel must be immersed in water, slightly heated, by which the ice is loosened from the sides, and easily slips out.

The annexed plate, No. 2, represents a castellated portion of ice, in its capacity as a wine cooler, the stand being an ornamental tray, to catch any melting portions, as soon as formed. This machine is equally efficient in any climate, and would effectually accomplish the desired end in an atmosphere heated to a considerable temperature. Boiling water might be easily frozen. In this instance, however, more than one charge would be necessary, the first being removed, and a fresh one added; the process thus continued would assuredly accomplish the most exaggerated cases. In freezing dessert ices, it is necessary to guard against concocting them too richly, otherwise they are unable to be frozen by any means. To remedy such mistake, I have subjoined a number of recipes for compounding such confections as are most generally desired.

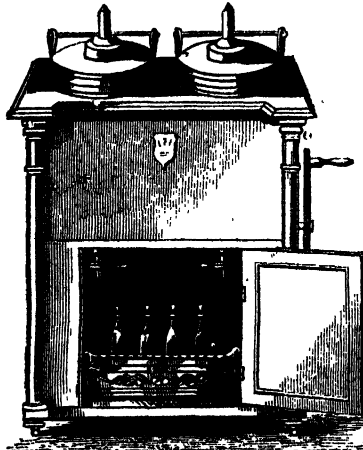
Plate 2.



Patent Wine Cooler, containing a Cylinder of Ice produced by the Machine from pure water, while freezing the Dessert Ices.

Plate 3 represents a double freezing machine, which, being a multiplication of the last, it is unnecessary to describe. The only advantage gained is, of course, the preparation of quantities, and is generally employed in large families, hotels, and club-houses. The wine cooler formed by a vessel, so disposed as to receive the salts an liquid (allowed to escape, when exhausted, from

Plate 3.



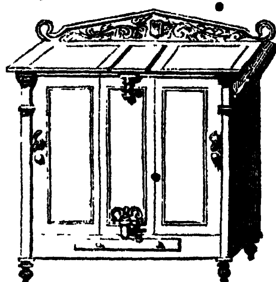
A Patent-Double Freezing Machine, by which two distinct Dessert Ices may be frozen at once by one person.

the freezing chamber above), is here clearly defined. The above machines are so modified, and provided with necessary distinct portions of apparatus, that wine may be introduced in the freezing chamber above, and thus surrounded by the freezing mixture, and agitated by the rotary motion of the machine, it becomes quickly reduced in temperature. Other modifications are employed, to render the machine

even more economical, for the use of confectioners, hotels, &c., where the employment of ice and salt would be most general; these are not, however, so ornamental or complete, although fulfilling every purpose. The churn machine depicted on the exterior cover of this book is perhaps more portable, but being of different arrangement, is not so easily managed, or so generally preferred.

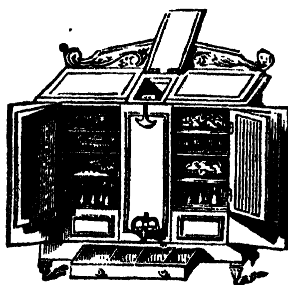
Plate 4 represents the "patent preserving safe, or cooling apparatus." It consists of a double lined box, fitted with metallic lining so constructed as to

Plate 4.



The Patent Ice Safe when closed.

Plate 4.



The Patent Ice Safe with doors open.

The Patent Ice Safe contains an Ice Well in the centre, with a Water Well by which water may be constantly kept cold. The closets at each end and the drawers at the bottom are for preserving Game, Fish, &c. from the effects of heat, and for cooling wine, &c. An Air Pump is fixed to the side for exhausting hot air when required.

allow the cooling power to percolate through the interior, the inner case being carefully provided against loss by means of non-conducting materials. The upper portion of this machine is a reservoir for containing the cooling power, ice, &c. This is introduced and allowed to remain for any length of time required. As the ice or mixture passes into solution, it is conducted by pipes throughout the

whole interior surface, trays, &c., eventually escaping by the tap, represented at the lower portion of the machine. This apparatus requires no attention when once supplied; the freezing materials will retain the necessary cooled atmosphere for a very considerable period. By aid of this safe, Game, Fish, Poultry, in fact, all organic substances, may be preserved without fear or danger of becoming tainted. This contrivance may also serve the purpose of a warming apparatus; for this end it is only necessary to supply hot water, in place of the cooling mixture above. This in like manner traverses the whole of the interior, and thus may be made to retain a considerable heat for any length of time.

Plate 5.



Masters' Patent Sherry Cobbler Freezing and Cooling Jug, for producing pure Ice from Spring Water, on the table or sideboard, in 5 minutes, at the cost of 2d., in the hottest climate. Price 30s. and upwards.

The annexed represents what I have termed the Sherry Cobbler, or dessert ice apparatus, it being for the purpose of manufacturing a sufficient quantity of *pure spring* water ice, for compounding the former delicacy in the course of two or three minutes. This apparatus is also modified to freeze small quantities of dessert ice and water. In this case, the relative positions of freezing compound and material to be frozen are conversed. This may be termed a double cylinder apparatus, the inner one being for the freezing mixture, and the outer for containing the water to be frozen.

The mode of operation is as follows:—Into the case or outer cylinder place a sufficient quantity of water to allow the entrance of the inner cylinder, without causing an overflow,—this is the water to be frozen. Into the inner vessel is now placed a measure of each of the feezing compounds (these, as well as the measures, funnels, &c., can be had with the machine), and the cylinder returned to its position in the exterior casing; water is now to be added to the freezing mixture, until the inner vessel is nearly filled, care being taken that none of the salts are allowed inadvertently to find their way to the water in the outer cylinder, and the contents are kept stirred or beaten up, by means of a rod provided for that purpose. The agitating process is not absolutely necessary, only where the operation requires speedy fulfilment. After continuing the admixture for two or three minutes, the inner cylinder may be removed, deprived of its contents, and filled with common spring water. This will cause the detachment of the mass of ice, (coating the exterior of this cylinder), which will gradually slip off and may be received in a plate or dish, and applied for the purposes for which it is desired. This principle is also applied to jugs for cooling water, the jug being for this purpose fitted with an interior cylinder, similar to the last, or, as is the case in some instances, having an interior cylinder connected to it in the process of manufacture. The mixture in the latter case is introduced from the bottom of the jug; both forms are, however, equally the same in effect and principle.

Plate 6 represents the butter cooling apparatus, made in a manner precisely similar to that noticed in connection with the jugs, being manufactured of two vessels, one contained within the other. The freezing mixture is placed in the tube beneath. The operation is here analogous to that already detailed, the only difference being, that instead of "stirring," the apparatus is shaken, to cause admixture, and then allowed to remain, the cooling power required being not so intense or speedy as for producing a cylinder of "ice," for purposes of immediate use.

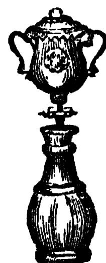
Plate 6.



Masters' Patent Butter Cooler and Freezer.

Plate 7 is the patent percolating funnel and strainer, for cooling, wine, water, &c., in two minutes, without expense or trouble. This vessel is, like the last, composed of an interior and exterior apparatus, the interior being a percolating worm, winding throughout the inner space between the two cases, and surrounded by the freezing mixture, eventually terminating in the neck entering the decanter. If it is only required to cool wine, it may be passed through at once into the decanter, being sufficiently cooled in its passage through the percolator (in contact with the freezing mixture), for all ordinary purposes. Sometimes, however, it may be requisite to attain a greater amount of

Plate 7.



Masters' Patent Icing Percolating Funnel for regulating the temperature of water, wine, &c. in a few minutes, without ice, at the cost of one halfpenny.

cold; for this purpose the percolator is provided with a tap, so that the wine may be kept in the strainer, and thus in contact with the cooling power, until it has acquired the desired temperature. In this, as in all of these contrivances, it is, of course, necessary to first charge the machines previously to introducing the beverages to be cooled.

Another plan is represented in Plate 8, where the decanter is manufactured with an interior cylinder, so as to allow the cooling vessel passing upwards, and diffusing its power throughout the contents. The freezing vessel for containing the cooling power is in connection with the decanter-stand; being thus fixed, the bottle may be removed and replaced at pleasure; the superiority and convenience of this, as well as the preceding contrivance, needs no comment.

Plate 8.



Masters' Patent Cooling Decanter or Claret Jug.

Plate 9 is a representation of an apparatus for filtering and cooling water or other liquids at the same instant of time. The upper vessel constitutes the filterer,—the lower the cooler. The cooler is charged in the ordinary way, and the materials to be filtered are placed in above,—thus passing through the filterer and the cooling apparatus attached, the object required is gained. It is to be understood that the descriptions here given convey but a brief

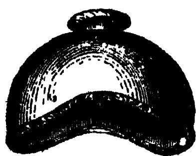
Plate 9.



Masters' Patent Cooling and Freezing Filterer.

idea of the extent of these applications; they are not, as can be easily understood, confined within such limits, but may be increased, to suit the wants of all parties.

The last appliance I may here notice is one not so general as those preceding,—but none the less interesting, inasmuch as my aim has been to afford relief and mitigate the sufferings felt so acutely in many diseases common to our nature. This I have termed the Ice Helmet. Like the before mentioned vessels, it is double. The freezing mixture is introduced in the cavity between, and after a few seconds agitating, it may be applied. The inconvenience attendant upon the application of ice to the head may be well imagined, and the application of an "Ice Night-cap" is too unpleasant an affair to be described. Here, the extreme simplicity of this contrivance is at once apparent, and its use, though not general,—or to be wished more so,—may be appreciated in those instances where necessity,—"that stern monitor," compels.


Patent Cooling Cap for surgical purposes.

CHAPTER IV.

RECIPES FOR THE PRODUCTION OF THE MOST CHOICE & DELICATE ICES, CREAMS, &c.

NESSELRODE, OR FROZEN PUDDING.

Take one pint of cream, half-a-pint of milk, the yolks of four eggs, one ounce of sweet almonds, pounded, and half-a-pound of sugar; put them in a stewpan on a gentle fire; set it as thin as custard; when cold, add two wine glasses of brandy, and two wine glasses of nectar (a delicious beverage prepared only by the author), freeze, and when sufficiently congealed, add one pound of preserved fruits, with a few currants; cut the fruit small, and mix well with the ice, and put it into moulds; then immerse in a freezing mixture, such as ice and salt, &c., until required for table.

CUSTARD ICE CREAM.

Take a pint of fresh cream, add the yolks of six new-laid eggs, stir them up well with a whisk, add a thin slice of lemon-peel as for custard; put the pan on a gentle fire, or in hot water, stirring

it until the cream appears to be setting; remove it from the fire, and add pulverized sugar to palate; place it in a vessel of cold water, and continue stirring a few minutes, to prevent its curdling; give it any flavor you please, strain it through a sieve, then put it into the freezer, and proceed as before directed. One quart.

STRAWBERRY ICE CREAM.

Pick some strawberries (the scarlets are considered the best,) into a basin or pan, add sugar in powder, with a quantity of strawberry jam equal to the fruit, the juice of a lemon or two, according to palate, a small quantity of new milk, and a pint of fresh cream; mix, and add a little colour; the recipe for which is given in page 39; freeze. One quart. Or, when fresh strawberries cannot be procured, take one pound of strawberry jam, the juice of one or two lemons, one pint of cream, and a little milk; colour; freeze. One quart.*

* Should the cream be found not to freeze so quickly as you wish, add a little more new milk. This applies to all ice creams.

RASPBERRY ICE CREAM.

To one pound of raspberry jam, add the juice of one or two lemons, one pint of cream, and a little milk; colour; freeze. One quart. If raspberries are in season, it may be made with equal portions of raspberries and jam, and a small quantity of sugar.

CURRANT ICE CREAM.

The same as strawberry, only that a few raspberries or strawberries may be added to give it a zest.

PINE APPLE ICE CREAM.

To half-a-pound of preserved pine-apple pounded with sugar, add sugar and lemon-juice to palate, one pint of cream, and a little new milk. Mix; freeze. One quart. Or, take a pine-apple weighing about half-a-pound, cut in pieces, bruise it in a mortar; add half-a-pound of sugar, the juice of one lemon; rub them well together in the mortar, pass through a hair sieve; freeze. A few slices of preserved pine-apple may be added when frozen. One quart.

GINGER ICE CREAM.

Bruise six ounces of the best preserved ginger in a mortar, add the juice of one lemon, half-a-pound of sugar, one pint of cream; mix well, strain through a hair sieve; freeze. One quart.

APRICOT ICE CREAM.

Take half-a-pound of apricot jam, add one pint of cream, the juice of one lemon, six bitter almonds pounded, one glass of noyeau. Mix in a mortar; rub through a hair sieve; freeze. One quart.

MILLE FRUIT ICE CREAM.

Take the juice of two lemons, one pint of cream, half-a-pound of sugar, one glass of wine, one glass of grape syrup; mix; freeze. Cut a quarter-of-a-pound of preserved fruits, as for Nesselrode; mix them well with the ice, and place it in a mould. One quart.

ITALIAN ICE CREAM.

Rasp two lemons on some sugar, compress the juice from the lemons, to which add one pint of cream, one glass of brandy, one glass of nectar, half-a-pound of sugar; freeze. One quart.

RATIFIA ICE CREAM.

Take one pint of cream, a little milk, half-a-pound of sugar, the yolks of two eggs, two ounces of ratifias; put them into a stewpan over a gentle fire, set as thin as custard. Add the juice of half a lemon, when cold, freeze; take two ounces more ratifias, rub them through a sieve, and add when the former is frozen, together with one glass of noyeau or maraschino. One quart.

LEMON ICE CREAM.

Take one pint of cream, rasp two lemons on sugar, scrape off into the vessel you are about to mix in; squeeze them, and add the juice, half-a-pound of sugar; mix; freeze. One quart.

VANILLA ICE CREAM.

Pound two sticks of vanilla, or sufficient to flavour it to palate, in a mortar, with half-a-pound of sugar; pass through a sieve, put it into a stewpan, with half-a-pint of milk; boil over a slow fire, with the yolks of two eggs, stirring all the time, the same as custard; add one pint of cream, and juice of one lemon; freeze. One quart.

BROWN BREAD ICE CREAM.

Take a slice of bread, browned in the oven, half-a-pound of sugar, half-a-pint of milk; two sponge biscuits, one pint of cream; put in a stewpan, stir over a gentle fire, like custard, pass through a sieve; brown two slices, crumble them, and sift them as for bread crumbs. When the mixture is frozen, add the bread crumbs with a glass of maraschino. One quart.

PLAIN ICE CREAM.

To one pint of cream, add the juice of one lemon, half-a-pound of sugar, a little nutmeg; mix; freeze. If too rich, add a little new milk.

PISTACHIO ICE CREAM.

Take one quarter-of-a-pound of pistachios, and the same quantity of Jordan almonds, blanch and pound in a mortar until fine; add the juice of one lemon, half-a-pound of sugar, one pint of cream; pass through a sieve; freeze. One quart.

BISCUIT ICE CREAM.

To one pint of cream, add a little milk, two ounces of Naples or Victoria biscuits, the yolks of two eggs, half-a-pound of sugar; stir gently over a slow fire, the same as custard; pass through a sieve, freeze; when frozen, add a glass of nectar, and put in a mould. One quart.

MARASCHINO ICE CREAM.

One pint of cream, the juice of one lemon, half-a-pound of sugar, two glasses of maraschino; mix; freeze. One quart.

NOYEAU ICE CREAM.

One pint of cream, the juice of one lemon, half-a-pound of sugar, two glasses of noyeau; mix; freeze. One quart.

CINNAMON ICE CREAM

Is prepared in the same manner as vanilla.

COFFEE ICE CREAM.

Take six ounces of the best Turkey coffee berries, well roasted, put them on a tin, and place them in an oven for five minutes; boil one pint of cream and half-a-pint of milk together, and put them into a can; take the berries from the oven, and put them with the scalding cream; cover till cold; strain, and

add one ounce of arrowroot; boil like custard, and add half-a-pound of sugar; freeze. One quart.

HOWQUA'S TEA ICE CREAM.

One pint of cream, half-a-pound of sugar, one ounce of tea, or a sufficient quantity to make one cup; mix with the cream; freeze. One quart.

CHOCOLATE ICE CREAM.

Infuse four or six ounces of chocolate; mix it well with a pint of cream, a little new milk, and half a pound of sugar; strain; freeze. One quart.

COLOUR.

One ounce of cochineal, one ounce of salts of wormwood, one pint of water; boil for five minutes over a slow fire; three ounces of cream of tartar, and one ounce of roach alum. Take it off the fire before you add the two last ingredients, which must be put in very slowly, or the mixture will overflow. If for keeping, use clarified sugar instead of water.

WINE ICES.

Take a pint of any kind of wine, rasp four lemons and an orange on a lump of sugar, which scrape into the vessel in which the composition is about to be mixed; extract the juice of the

lemons and orange, add the wine, with a small quantity of water, and half a pint of clarified sugar; freeze. One quart.

NECTAR ICE.

One pint of water, and one pint of nectar; mix and freeze. One quart.

PUNCH ICE.

Take one pint and a half of lemon ice (for which see page 42), and add one glass of nectar, one of champagne, one of rum, and the juice of two oranges; freeze. One quart. This may be made

PUNCH A LA ROMAINE,

By well whisking the whites of two eggs, and mixing half a pound of powdered sugar gently with the whites. The ice must be well frozen before the eggs and sugar are added.

PUNCH ICE.

To one pint and a half of lemon water ice, add one glass of white rum, one of champagne, one of pale brandy, and half a glass of warm jelly; or the rum and wine may be omitted, and replaced by two glasses of nectar; freeze. One quart.

PUNCH ICE.

Rasp two lemons, take the juice of six lemons, the juice of two oranges, half-a-pint of water, one pint of clarified sugar; mix; add one glass of rum, one glass of brandy, one glass of nectar; freeze. One quart.

PUNCH A LA VICTORIA.

Rasp two lemons, take the juice of six, the juice of two oranges, half-a-pint of water, one pint of clarified sugar; mix; strain; freeze hard. Add one glass of rum, one of brandy, one of nectar; charge the ice again, as the spirit will bring it down; beat up the whites of three eggs quite firm, put one quarter of a pound of sugar with the whites; stir it gently in, put it to the ice, and mix slowly. One quart.

WATER ICES

Are essentially different from cream ices, both as regards amalgamation and taste,—the one having the richness of cream, the other only the purest water, flavoured by fruit. The superior manner in which Ices are produced and beaten up by the apparatus herein described, renders them exceedingly delicious.

LEMON WATER ICE.

Take three lemons and rasp them on sugar, the juice of six lemons, the juice of one orange, one pint of clarified sugar, and half-a-pint of water; mix; strain through a hair or lawn sieve; freeze. One quart. Or, take a sufficient quantity of lemons, six or eight to one quart; rasp three or four of them on a lump of sugar, and scrape it into the vessel you are about to mix in; squeeze the lemons, and add the juice of two oranges, half a pint of water, and one pint of clarified sugar; strain; freeze

ORANGE WATER ICE.

The raspings of three oranges, the juice of four oranges, half-a-pint of water, the juice of two or three lemons, one pint of clarified sugar; mix; strain; freeze. One quart. Or, take any number of oranges, in the same proportion as lemons, for lemon water ice, only rasping one of the oranges;—be careful not to rub the orange too hard, or the ice will be bitter;—a table spoonful of warm jelly may be added at pleasure; strain; freeze.

GRAPE WATER ICE.

The juice of four lemons, the raspings of one orange, half a pint of water, one pint of clarified sugar, two glasses of grape syrup, one glass of sherry; strain; freeze. One quart.

PINE APPLE WATER ICE.

Take half-a-pound of fresh pine apple, bruised fine in a mortar, add the juice of one lemon, half-a-pint of water, one pint of clarified sugar; pass through a sieve; freeze. One quart. Pine apple may be added as described in the recipe for pine apple ice cream, page 35.

CHERRY WATER ICE

One pound of Kentish cherries, bruised in a mortar with the stones, add the juice of two lemons, half-a-pint of water, one pint of clarified sugar, one glass of noyeau, a little colour; strain; freeze. One quart.

CURRANT WATER ICE.

One pint of red currants, the juice of two lemons, half-a-pint of water, one pint of clarified sugar, a little colour; freeze. One quart. A few raspberries may be added to heighten the colour.

VANILLA WATER ICE.

Pound two sticks of vanilla, or so much as may be deemed sufficient to give a proper flavour, in a mortar; put half-a-pint of water in the mortar, so as to get all out; put it into a stew-pan, with one pound of sugar; boil together; strain through a fine sieve; add the juice of one or two lemons; freeze. One quart.

PEACH WATER ICE.

Take six fine peaches, the juice of two lemons, one pint of clarified sugar, half-a-pint of water. Rub through a sieve; freeze. One quart.

STRAWBERRY WATER ICE.

One pottle of scarlet strawberries, the juice of two lemons, half-a-pint of water, one pint of clarified sugar, a little colour. Freeze. One quart.

RASPBERRY WATER ICE.

One pottle of raspberries, the juice of two lemons, half-a-pint of water, one pint of clarified sugar. Colour; freeze. One quart.

MILLE-FRUIT WATER ICE.

Rasp two lemons, the juice of one orange, the juice of six lemons, half-a-pint of water, one pint of clarified sugar, two glasses of grape syrup, one glass of sherry, and a quarter-of-a-pound of the best preserved fruit; cut fine. When the Ice is frozen, add the fruit.

MELON WATER ICE.

Half-a-pound of ripe melon, pounded in a mortar, the juice of two lemons, half-a-pint of water, one pint of clarified sugar. Strain; freeze. One quart.

BARBERRY WATER ICE.

Take a sufficient quantity of syrup from the barberries, the juice of four lemons, half-a-pint of water, one pint of clarified sugar; colour; strain; freeze. One quart. Or, add barberry syrup to lemon water ice to flavour it.

BARBERRY SYRUP.

Choose the finest and ripest barberries, boil them in clarified sugar for about ten minutes; when cold, bottle it for use.

APRICOT WATER ICE.

Take six ripe apricots, rub them through a lawn sieve, with the juice of two lemons, the kernels pounded fine, one pint of clarified sugar, and half-a-pint of water; strain; freeze. One quart.

APPLE WATER ICE.

Quarter some fine apples, take out the cores, put them in a stewpan, boil them until they become of a proper consistency, rub them through a sieve, and add lemon water to palate. Freeze.

GINGER WATER ICE.

Take six ounces of the best preserved ginger, pound two-thirds of it in a mortar, and cut the rest

into very thin slices, add a sufficient quantity of lemon water; ice (about a quart); put the ginger in; mix; freeze.

TO CLARIFY SUGAR.

Take twelve pounds of sugar, twelve pints of water, half the white of one egg, well beaten up; add to it the water; boil ten minutes. This is used in all water ices.

APPENDIX.

For a long time the peculiar opal appearance of the Ice produced from one and all of these machines gave rise to numerous speculations to account for the remarkably different appearance between this artificial production and that provided by nature. The mere inspection of two samples obtained from these two sources, will serve to point out the crystalline transparent nature of the one, and the semi-opacity of the other; this is entirely dependant upon the rapidity of the passage of a fluid from its liquid to the solid state; where the process is slow and gradual, the particles arrange themselves in a crystalline state, and the resulting solid body becomes regular in arrangement, and in many instances transparent; where, on the other hand, the process is rapidly completed, sufficient time is not obtained to assume this regular arrangement, the body, therefore, solidifies in an amorphous or uncrystallized state, and is opaque. Many substances exist in nature, presenting exactly the same

appearances in relation to each other (under different circumstances), as we have herein mentioned. Thus, quartz and rock crystal represents the element Silex under two forms, the ruby and sapphire, opposed to the general appearance of aluminous bodies is another instance, and out of a multiplicity of such evidence we may notice the diamond existing as it does in the milky and transparent state; and carbonate of lime or chalk opaque, as in marble, or beautifully transparent, as in Iceland spar.

I am proud to acknowledge the following letters and certificates, bearing testimony to the efficacy and utility of these inventions:—

From John Ryan, M.D., LL.D., M.R.C.S.E.,

Lecturer on *Materia Medica*, at the Charlotte-street School of Medicine, Bloomsbury, Professor of Chemistry to the Royal Polytechnic Institution, and the Royal Naval College, Portsmouth.

20, *Somerset-place, Portman-square,*
September 28, 1844.

My Dear Sir,—Having had several opportunities of observing your method of making artificial Ices and Ice Creams by your patented machinery, I cannot avoid the expression of my delight at the rapidity and perfect success of the whole process. In many instances, without previous preparation, you formed for me cherry, ginger, lemon, and vanilla ices, in the course of two minutes, and in an incredible short space of time produced in the same machine, and by the same process, an immense block of ornamental ice, in which you had imbedded leaves

and various fruits, giving the whole a most beautiful and unique appearance; in fact, I could scarcely believe at first, that you had merely employed pure water, and it was only after careful examination and analysis I became convinced. You have certainly conferred upon society a great obligation, in thus enabling us to form, in our own dining-rooms, this healthful delicacy, and this too in so small a space of time, and by means of such portable and elegant machinery

To the medical profession, you may confidently look for approbation, for you enable them, at all seasons, whether in the crowded fever ward of the hospital, or in private practice, to obtain for the patient a necessary adjunct to medical treatment.

Believe me yours, truly,

JOHN RYAN, M.D. LL.D.

To Mr. Masters.

From Wm. Radley, L.A.C.,
D.M.P., M.D., Lugd. Bat.

Lecturer on Technological Chemistry.

London, September 30, 1844.

Sir,—The rapid and easy production of Ice in its simple state, as well as in the forms of iced creams, liquids, &c., by your patent freezing apparatus, created in me feelings of the most intense admiration and astonishment. Acquainted previously with the chemical details of the production of ice by the rapid solution of saline substances, with and without the use of ice, I was prepared to expect a result which falls short of what you are capable of per-

forming by your machine. The production of four different iced liqueurs within the short space of two minutes absolutely astonished me; nor can I account for the difference of power between your improved mode and the common method of freezing, than by the supposition, that the superior efficacy depends mainly on the large amount of freezing surface available from the use of your patent spatula. To the prospective eye of the medical philosopher, your simple invention opens many new and important views, in its application to the healing art; and I doubt not, that it will ere long be the means of becoming an extensively useful local remedy for banishing from our pharmacopœia a great mass of the useless lumber which clogs our medical practice, and tends to associate us with the class of empirics.

To the hospital, the surgery, or the hotel, this unique machine will, in its products, fail not to become an absolute desideratum, and be esteemed second to none of the most useful domestic or culinary utensils, which time, utility, and custom have made absolutely necessary.

Under the firm impression that your invention deserves well of the public, I wish you the most complete success, whilst I tender to you this small testimony of my satisfaction and approbation, and remain,

Dear sir, your most obedt. servant,

WM. RADLEY.

To Mr. Masters.

ICES

The following portable Ices are Prepared and Sold only by T. Masters, 333, Oxford Street, and 309, Regent Street, (adjoining the Royal Polytechnic,) Patentee of the various Apparatus described in the preceding pages:—

Lemon Ice.	Raspberry Ice.
Orange Ice.	Nectar Ice.
Ginger Ice.	Vanilla Ice.

&c., &c., &c.,

to either of which it is only requisite to add half-a-pint of water to the same quantity of Ice or Syrup and freeze, the operation of which may be performed in three or four minutes by Masters' Patent Freezing Apparatus,—ample directions are given on each bottle and wrapper. Each of these portable Ices is capable of making a superior cooling drink, by putting a wine glass of the syrup into half-a-pint of iced water, or a glass of soda or äerated water,

or as much as will suit the taste. The Lemon Nectar and Orange are most excellent additions to Punch or Negus,—imparting to them a rich and racy flavor rarely to be produced by any other means.

Pints, each	2s. 6d.	Per dozen	28s.
Quarts, ,,	5s. 0d.	,,	54s.

The various Machines may be seen in operation, and their use and management explained to visitors, at the Patentees Repositories, 333, Oxford Street, Regent Circus, 309, Regent Street, (adjoining the Royal Polytechnic Institution,) and No. 7, Mansion-House Street, City, London.

AERATED WATERS;

AND THE

AERATED OR SODA-WATER MACHINE.

We now come to an interesting and important portion of our description, viz., the formation of aerated fluids, and the production of similar compounds to those found in nature, used and highly extolled for their medicinal virtues. In this instance, however, we are enabled, by the apparatus employed, to produce them much stronger than those afforded by nature, and therefore, having much greater medicinal effects.

The active agent herein employed is that entering into the constitution of all fermented liquors, they owing their briskness and sparkling appearance to the presence of a gas termed carbonic acid, and it is this gas of which we are about to treat. So important are the characters of this gas, and so universally is it present throughout nature, that it may not be considered misplaced, nor prove uninteresting to trace its origin, the various sources from

which it is constantly produced, and the peculiar properties of which it is possessed, both in a chemical, as well as medicinal, point of view. This mineral acid has occupied a most prominent position in chemical history; and we should not be overrating its importance, were we to ascribe to its discovery the rapid progress of chemical science. During the latter portion of the 18th century, Paracelsus and Van Helmont became acquainted with the fact, that air was extracted from solid compounds during certain processes. Van Helmont gave to this air the name of "gas." Boyle termed these airs "artificial airs;" and was the first to suspect their difference from the atmosphere. Hales tried a variety of experiments, and ascertained the quantity of gas that could be extricated from many solid bodies, and proved that it formed an essential portion of their composition.

In the year 1757, Dr. Black discovered this important compound in certain substances called lime, magnesia, and alkalies; and showed that these were compounds of a peculiar species of air and pure lime, magnesia, and alkalis; owing to its existing in a solid state in these compounds, he gave it the name of "fixed air," and under that name described it in his inaugural dissertation on magnesia. Dr. Priestly afterwards investigated this air, and discovered many of its properties; which led Mr. Kier first to conclude that it was an acid; this opinion was soon afterwards confirmed by Bergman, Fontana, and others. Dr. Priestly first discovered its

presence in atmospheric air; and Bergman, from this fact, termed it "aërial acid." Mr. Bewley gave it the name of "mephitic acid," because it could not be respired without occasioning death; this name was also adopted by Morveau. Mr. Kier called it "calcarous acid;" and at last M. Lavoisier, after ascertaining its composition, termed it "carbonic acid gas." The opinions of scientific men regarding the composition of this substance, have undergone as many revolutions as its name. It was first supposed to be an element, and several celebrated chemists maintained it was the acidifying principle; it was afterwards discovered to be a compound, and that oxygen entered into its composition. Upon this discovery, the prevalent opinion of chemists was, that it was compounded of oxygen and philogiston. When, however, hydrogen and philogiston, according to Mr. Kirwan's theory, came to signify the same thing, it was, of course, maintained that carbonic acid was compounded of oxygen and hydrogen; and although M. Lavoisier demonstrated beyond doubt that it was formed by the combination of carbon and oxygen, still, however, the old theory was maintained, because then carbon was itself considered as containing a large quantity of hydrogen in its composition. But after M. Lavoisier proved that the carbonic acid produced was exactly equal to that of the oxygen and charcoal employed; after Mr. Cavendish had discovered that oxygen and hydrogen, when combined, did not form carbonic acid, but water, it was no longer possible to doubt

that this acid was composed of carbon and of oxygen; all further dispute was therefore at an end. If anything further was wanting to put this conclusion beyond a doubt, it was to decompose this gas, and thus to exhibit its component parts by analysis, as well as synthesis. This was accomplished by Mr. Tennant, who first decomposed it, and exhibited the charcoal entire; the experiments of Mr. Tennant were afterwards repeated by Dr. Pearson, who also added to them. Fourcroy, Vanquelin, Sylvestre, and Brongniart, confirmed these investigations; and thus, after great contention and a vast amount of scientific enquiry, its title to carbonic acid as a name became acknowledged, and set at rest.

Carbonic acid, in its separate condition, and under ordinary circumstances, is a gaseous compound, transparent, and colourless. It has, however, a pungent smell and taste, and is much heavier than atmospheric air. Owing to this fact, it is sometimes found in low situations; and where its escape is not sufficiently promoted to prevent its accumulation, forms an invisible lake of this gas. Carbonic acid has been rendered solid in an isolated condition by certain philosophers; it then assumes a white solid appearance, similar to snow, and is capable, under certain conditions, of producing intense cold. The existence of this gas in one form or other is, as we before stated, almost universal. It forms a certain proportion of the air we breathe; almost all waters contain it, and

these owe their peculiar exhilarating quality to its presence,—for waters deprived of this gas are rendered dull and vapid, and quite unfitted for general purposes. It is continually formed by the oxidation of the blood contained in our bodies, and in the bodies of all animals. Plants, likewise, from the commencement of the process of germination upwards, are dependent upon this compound for support. It forms no inconsiderable portion of the solid matter of this globe;—it exists in all carbonates. Limestones and chalk contain as much as 44 per cent. of this gas locked up in the solid state. Carbonic acid is compounded of a solid substance, charcoal, or carbon, combined with a gaseous principle called oxygen. When these elements are brought to act upon each other, under the influence of heat, carbonic acid is produced; and, strange as it may appear, it may be obtained pure by burning the diamond in oxygen gas; this valuable gem being nothing but the elementary substance—carbon, in a crystallized condition. So, also, charcoal in its various forms, when burnt, produces carbonic acid, by reason of its combination with oxygen,—6 parts of carbon, combining with 16 of oxygen, to form 22 parts of carbonic acid. As we have stated, it forms a considerable proportion of all carbonates, and from them it may be expelled in a gaseous condition by means of heat; the preparation of lime in kilns, is an example of this fact. The carbonate of lime or chalk being exposed to a considerable

temperature, loses its carbonic acid, and becomes converted into quick-lime. Carbonic acid is usually and most easily prepared by acting upon these substances, by means of a stronger acid than that which they already contain; for this purpose, some earthy or alkaline carbonate is employed. The stronger acid unites with the base previously in union with the carbonic acid, and the latter comes away in the gaseous form. Carbonate of lime, in the form of chalk,—or still better, marble is most generally employed, and the gas expelled by diluted hydro-chloric or sulphuric acids. Carbonic acid is an exceedingly heavy gas,—so much so, that it may be poured from one vessel to another like water; it exists in the air, as before stated, in small quantities,—and to its presence plants are mainly dependent for their support. Although seemingly but small, in comparison with the bulk of air, carbonic acid would, did it obey the usual laws of gravity, form a stratum upon the surface of the earth thirteen feet deep; this, however, it is prevented from doing, owing to another property held by all gases in common, termed diffusion,—and this it is that distributes the different gases entering into the composition of our atmosphere, equally throughout each other. It is found, however, that this gas, in its concentrated condition, unmixed with other fluids, is unfitted for preserving the integrity of animal or vegetable life. Plants will not live in an undiluted atmosphere of this gas, neither can an animal respire it;—mixed with other gases and fluids, animals are benefitted

by its influence,—and the vegetable world, under its nutritive qualities, carries on the operation of vitality with redoubled vigour. This gas is known in mines by the name of choke damp, and results from the combustion of certain gases during an explosion, or is eliminated from fissures in the earth. In this condition it acts upon the epiglottis, when respired, which spasmodically closes, producing stupefaction, and ultimately, if continued, more evil consequences. Possessing this powerful action upon the human system, it would at first sight appear the very last of all ingredients to become a constituent of our table beverages; science and experience, however, have proved its value,—and the beneficial effects resulting from its use. That which, inhaled into the lungs of man, would prove at once his destruction, becomes, when taken into the stomach, a highly salutary draught. We have previously remarked upon the almost general presence of this gas, nor is this astonishing, when we understand the continuous thread of its production. During the process of respiration, this gas is given off in large quantities; a healthy man exhales as much as 44,000 cubic inches daily. The breathing of all animals, of whatever kind, results in the production of this gas; the process of respiration is, in fact, a process of combustion—the burning of the carbon of the blood, by means of the oxygen of the air contained within the lungs. The blood, in its passage through the body, becomes de-oxidated of a dark colour, known as venous blood; this is brought, by means of the

capillaries, in contact with the oxygen of the air; combustion of the carbon with the oxygen takes place,—carbonic acid results, and is sent off in the gaseous state at each expiration. Whenever combustion proceeds of those substances containing carbon, this gas is also produced;—coals, candles, wood, paper, charcoal, tallow, oil, wax, coal-gas, &c., all produce carbonic acid; in fact, their combustion is but an extended type of that, continually, but less energetically, proceeding in our own bodies. All decomposing animal and vegetable substances give off, as one of the products of such decomposition, carbonic acid,—and it is also produced in large quantities from certain natural springs existing in the earth, the result, no doubt, of volcanic heat upon certain minerals contained in the interior of the earth. Numerous instances might be recited of its natural production from such causes. In the valley of the Upas Tree, in the island of Java, there exists a natural spring of this gas,—and the peculiar characters belonging to this valley are owing to the existence of a subterranean source of carbonic acid, and not to the shadow cast by the tree, as is popularly believed. The "Grotto del Cano," or "Grotto of Dogs," near Naples, has long been famous, on account of the effects of a stratum of fixed air, which, owing to the peculiar formation of this cavern, covers its bottom; into this dogs are immersed for the entertainment of the curious. From this fact, it acquired the name "Grotto del Cano." These facts, tending to exhibit the continual

production of this compound, would lead us to feel somewhat astonished at its non-accumulation, and the absence of those evils that would be likely to result from such a cause. We do not find its proportions augmented in the air,—always the same unvarying quantity. How is this brought about?—Undoubtedly the preservation of the integrity of our atmosphere is owing to the action of plants, they being constantly engaged in decomposing this gas,—in extracting from its constitution the carbon so necessary to their growth and well-being, and returning to the atmosphere the oxygen gas, the other constituent of this compound. A beautiful instance this of the dependance in which all things were created;—man, for his support, depending upon the action of the vegetable world,—they in their turn being upon him dependant for the principle supply of that compound necessary for their continued existence. Man takes from the air its oxygen, and exhales in its place carbonic acid gas (which, if allowed to accumulate, would become a destructive agent); plants, on the contrary, take from this gas the carbon which it contains,—returning to the atmosphere the oxygen; thus is the balance of creation preserved, and all things continued in their integrity. How beautiful are the arrangements of nature?—how manifold the wonders that are displayed? Who can say that such are not the results of design, but of fortuitous circumstances? Abundant are the reasons to lead us to believe that every thing upon this fair world of ours is the effect of design,—

for all around us bears evident marks of the skill and benificence of its omnipotent author.

We have entered somewhat at large upon this subject—more so than we had intended,—its interesting relations must be our excuse for departing from those points connected more immediately with our present design.

Carbonic acid has been procured by the agency of intense cold and great pressure in the liquid form. Faraday, procured considerable quantities of this fluid—carbonic acid, and performed several curious experiments; when allowed to evaporate, it does so with great rapidity, and by reason of this evaporation, so much cold is produced, that many bodies exposed to its influence become immediately frozen; in fact, the reduction of temperature is so great, that during evaporation, itself becomes congealed, assuming a snow-like appearance. M. Thilorier was the first to produce this gas in a solid form, and by means of the improved apparatus of Mr. Adams, it may be prepared in very considerable quantities. When mixed with ether, it forms a pasty mass, by means of which mercury is immediately frozen; solid carbonic acid is one of the most powerful refrigerating substances known. This compound is exceedingly soluble in water; that fluid absorbs its own bulk of this gas at 60°, and under pressure it may be made to absorb it in larger quantities; it enters into the composition of many mineral waters, and these, as well as ordinary water, owe their sharp agreeable taste to the presence

of this gas; deprived of it, water becomes vapid and insipid; we have evidence of this fact in connection with water that has been boiled, and the carbonic acid thereby expelled. Many natural springs of water contain so great a quantity of this gas, that certain earths are rendered soluble,—such as carbonate of lime, magnesia, &c.; these, however, upon exposure, again become separated in an insoluble condition, and the earthy matters precipitate upon any foreign substances present in the water; this result was regarded as a miracle by the vulgar; and petrifying springs are associated with the memory of all. Such springs owe their peculiar power of encrusting foreign substances immersed therein, to the presence of this peculiar gas in large quantities.

Carbonic acid is possessed of peculiar antiseptic properties; meat which has been sealed up in it has been known to preserve its texture and perfect appearance for more than twenty years; founded upon this principle, a patent was obtained for preserving meat and other substances, the invention of Dr. Ryan, of scientific celebrity; he, by peculiar apparatus, contrived to apply this principle to the common concerns of life, and many experiments of a curious and highly satisfactory nature resulted from his investigations. It is in a medicinal point of view, that carbonic acid assumes its most important features. Fourcroy ascertained that carbonic acid largely diluted with air, could be inhaled without danger, and recommended its use to patients who have symptoms of ulceration or inflammation

of the lungs, and asserted that it would either cure these complaints, or retard their destructive effects.

Water artificially impregnated with this gas, was recommended by Dr. Percival, who esteemed it highly medicinal in pulmonic consumptions, and in malignant fevers, and even in cases of that malignant scourge "cholera," it has been found of considerable utility, so much so, in fact, as to render it as an adjunct indispensably necessary. Many successful practitioners in the treatment of this disease, have not hesitated to attribute wonderful effects to the administration of effervescing draughts with the medicine prescribed. Its general administration in one form or other by the faculty, and the quantities of carbonated fluids consumed, speak at once to its beneficial effects and highly salutary influence. Those waters imported from abroad, and so highly recommended for their salutary effects upon the constitution, contain large quantities of this gas; those of Pyrmont Spa, and Seltzer, are instances; the last, particularly, is highly impregnated with this acid. These waters are so pleasant and invigorating, that various imitations have been made in this country, and sold under the name of Single and Double Soda Water, and are equal, if not preferable to the natural waters imported from the continent. The term Aërated Water may, however, be popularly applied to a variety of acidulous and alkaline beverages, more or less impregnated with carbonic acid, or fixed air, and as the manufacture of these liquids has of late years become of

considerable extent, we purpose here describing the different modes and apparatus employed. Among the earliest of these contrivances adapted to the preparation of small quantities of aërated water, is the apparatus invented by Mr. Nooth, and known as "Nooth's Apparatus;" this consisted of three glass vessels, fitted one within the other; the lower vessel was for the purpose of generating the gas, and was termed the "generator," muriatic acid and marble being employed for its production; the gas being generated by its own pressure, lifted a small valve, and entered the second or middle receiver, containing the water or other fluid to be aërated, the upper receiver being merely to receive the surplus gas, and to guard in some measure against accidents from explosion. This apparatus was, however, soon discontinued, not only on account of the liability to accidents—should the different parts by any cause become disarranged,—but also because it was found that the fluid, after being prepared in this machine, was contaminated with portions of the acid employed,—these having been carried over mechanically by the gas. The next practice, and the one most generally followed, was to impregnate the fluid with the gas from a generator, kept separate and distinct from the substance to be aërated. A number of patent machines have been invented, these being, in fact, mere generators, in which the gas could be collected under great pressure; from thence, by peculiar apparatus, it might be transferred, and made to

impregnate any desired substance. Manufacturers of soda water, &c., now generally employ mechanical means to force the gas into the water, or fluid, contained within the bottles; this is accomplished by the use of a transferring pump or syringe, which is connected at one end with the receiver containing the gas, and at the other with a vessel, or single bottle of water.

These machines, admirably fitted for the purpose intended,—the preparation of these aërated fluids, on an extensive scale, become however a considerable inconvenience, if required for the preparation of repeated small quantities, no private person could command such extensive apparatus, or manage it supposing all other difficulties surmounted. The invention of some contrivance, for the accomplishment of the purposes of the above machine, on a scale adapted for private use, has long been a desideratum, and has occupied no small amount of the inventive ingenuity of man. Numberless have been the attempts to construct such apparatus. Some have in part succeeded, others have rendered the matter somewhat more convenient, by the use of syphon receivers, containing the fluid already charged: the charging being an operation requiring extensive and powerful apparatus, and therefore, only to be accomplished at the manufacturers, when the contents of the receiver become exhausted.

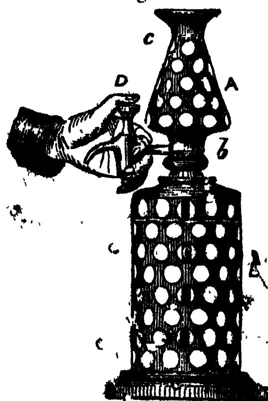
We now arrive at that point wherein we are enabled to introduce the new patent machine, known as "Masters' Patent Aërated Water Machine," the

only one of its kind now extant. By its aid, we may, in a few minutes, prepare any aërated water we please, nor are we confined to waters only,—all other beverages, no matter of what description, are as easily prepared. To this apparatus is attached no unwieldly appurtenances,—the whole machine, generator, and receiver, occupying but the space of a small table vase or decanter. Let us examine the action of this apparatus, and compare its qualities with those of which we have already spoken. In the first place, the acid generated is obtained from much more pleasant materials than is commonly the case,—the use of marble and hydrochloric acid, &c.,—being here replaced by compounds of the alkaline bases, the natural ingredients of all mineral waters. By their decomposition, carbonic acid, of a much purer character, is obtained, and any amount of impregnation is effected. The apparatus, in its various modifications, is extremely simple, and so contrived as to require but the smallest amount of attention or manipulation. A child may as easily prepare soda water as any other person, and quite as effectually, for it is impossible to err in the preparation, the machine being almost an automaton. I have for many years been impressed with the value and convenience of such a machine, could it be perfected, and have, through a like period, devoted much time and attention in accomplishing such aim. During the numerous experiments necessarily dependant upon such a course, I have contrived a great variety of

apparatus, none however being sufficiently perfect to complete the object I had in view, although to a great degree fulfilling the desired purpose, and in attentive hands, a vessel in every way perfect; still, I wished to bring it to that pitch of excellence which would ensure its success, and remove all chance of impediment to its introduction. This I have accomplished, and can with confidence recommend its use, as an article in every way fitted for employment, and one, by means of which, the most ignorant may at once prepare the most choice and delightful beverages.

I will now describe the apparatus in its various modifications, and the mode of procedure in the preparation of aërated fluids.

Fig. 1.



The general form is that presented in the accompanying sketch, (fig. 1). It consists of two portions, the generator, A, and the receiver, B. It will be noticed, that the generator has attached a pipe C, which reaches up its interior, and dips to the bottom of the receiver. This is double, and is constructed so as to have two channels, one within the other. The outer tube commences at the top of the generator, and is continued to within about one inch of the bottom of the apparatus; the inner pipe, however, leads from the bottom of the receiver to the tap,

and has no communication with the generator, it being only for the purpose of extracting the fluid after it is aërated. The mode of manipulation is as follows:—Unscrew the generator from the receiver at *b*, and fill the receiver with water, or ale, wine, beer, &c., up to the dotted line, and again tightly connect the apparatus. Now unscrew the upper portion of the generator at C, and half fill the same with water, then introduce the powders for the elimination of the gas, (these are supplied with the machine), the bi-carbonate of soda being placed in first, and again connect the apparatus as quick as possible; the vessel is now prepared, and the whole process completed. Chemical action is set up, and carbonic acid gas abundantly liberated; by its own pressure it is drawn through the outer tube into the receiver, where it fully saturates any substance placed there for impregnation.

Fig. 2.



The next form of apparatus (fig. 2), is perhaps, still better fitted for use, and differs from the last in having the generator at the lower portion of the apparatus. The manner of using is as follows: Unscrew the top, A, and by means of a funnel, pour in the material to be aërated up to the dotted line; having so done, again secure A in its former position. Next unscrew the generator at C, (holding

the vessel in an inclined position), and pour in water until it fills the generator about half full. This accomplished, introduce the powders required to generate the gas, and again secure the top of the generator, C, firmly in its place,—set the apparatus in its proper position, and the whole affair is completed. The action is evident the moment the machine is thus prepared; the water mixing with the powders contained in the generator, chemical action is set up (precisely as in the former operation), and pure carbonic acid gas is liberated. This is forced upwards, and enters the receiver, B. The contents of the vessel are afterwards drawn off by the tap connected with the tube. Sometimes this apparatus is contained within another, represented in the accompanying fig. 3, at E. This is

Fig 3

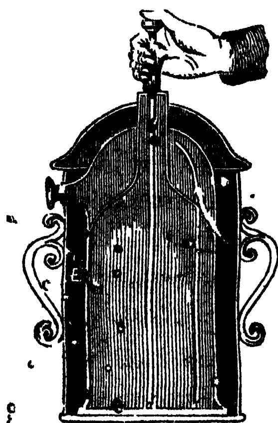
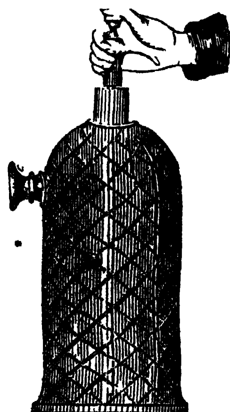


Fig 3.



for the purpose of cooling at the same time that the above operation is going on. This machine is

somewhat similar to the last; having, however, the addition of a cooling apparatus, as described; the different parts still remaining unaltered. When in use, the outer vessel, E, is filled with a freezing mixture or ice, in addition to the usual process of preparation.

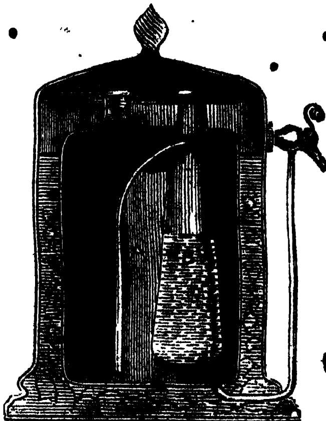
Another form consists of having the receiver, A, and generator, B, as herein represented (fig. 4.) The apparatus is unscrewed at *a*, *a*, and water poured into the upper vessel, A, to the dotted line; the two are again firmly connected. The vessel is inclined, and the generator supplied with water and the powders, in the same manner as previously pointed out. The gas enters the receiver, A, the contents of which, after becoming fully impregnated are drawn off at the tap, as usual.

Fig. 4.



A more complete arrangement is perhaps the following, (fig. 5), wherein we find the apparatus is still more simplified, the generator being contained within the receiver, — the whole being enclosed in an outer casing, by which means it is surrounded, if required, with a freezing mixture, and thus reduced to the temperature of ice-water. This apparatus differs from the former

Fig. 5



ones described, only in the position in which the generator, B, is placed, being here in the same direction as the receiver. They may both, by this contrivance, be charged without the trouble of moving the machine to a different position;—the various parts are the same as already described.

It is advisable to make use of the compounds employed for generating gas in a state of crystallization, great facilities in manipulation being thereby gained. When required to aërate wines, beer, &c., these do not require so much gas as water alone would; therefore in these instances only half the quantity of the crystals are made use of to furnish the gas for aëration. Liquids, when of a high temperature, will only with difficulty contain this gas; the liquid should therefore be as cold as can be conveniently procured, in order that it may imbibe the gas more quickly, and become more rapidly reduced in temperature. The usual quantity of compounds employed to charge one of these small machines is about five drachms of bicarbonate of soda, and eight drachms of crystallized tartaric acid. It is found in practice that from twenty to thirty minutes is ample time for the water to become fully charged. Should an alkaline water be preferred, it is only necessary to add a small quantity of the soda compound to the water in the receiver previous to charging. It will be seen at once from these descriptions, how very simple and easy of management is the whole contrivance; and from the fact that the compound, when once

prepared, may be kept without injury or deterioration for any length of time, coupled with the great convenience of being enabled to withdraw it in quantities suited to our taste and pleasure, we may without impropriety conclude, that the obstacles so long opposed to the introduction of aerated waters are entirely overcome; instead of, as in former years we were compelled to do (when so inclined), purchase a bottle of soda water, which at best, when much used, becomes expensive, we may now prepare an equally strong compound, and a much purer article, at a very trifling cost after the first outlay for the apparatus.

The operations of this invention are not confined solely to such model apparatus as herein described, for purposes of more general wants, such as for hotels, and other places of public resort,—they are increased in proportion so as to be equally fitted for large or small parties. Their value for such places, as well as for ships, &c., may be better imagined than described; and their economy is too evident to need any comment here. The aerated water machines are composed of glass and earthenware, materials well known for their purity and excellence for such purposes. It is also protected from injury by means of an outer casing, either of cane, metal, or gutta-percha, &c. Where, however, it is rendered, from its size, inconvenient to employ glass, it is replaced by porcelain,—an equally beautiful material; being, however, for this purpose, much more economical.

The smaller machines are well adapted for all private purposes; one of these is capable of containing about five or six times the contents of an ordinary soda-water bottle, and when once prepared, may, as previously pointed out, be consumed at pleasure. It has long been, and may now be considered impossible, to obtain that amount of pressure found in the common soda-water bottle, so highly necessary to the perfection of this compound. This notion, however, is a mistaken one, and in these machines fluid may be as fully impregnated as by any other process extant, with a difference in the amount of labour required, and the expense of producing it,—rendering any comparison with this apparatus impossible. The machines are duly proved and tested as to their freedom from any imperfection, which might interfere with their operations; and great care has been taken to render them in every way as ornamental as they are useful. Connected also with this portion of our subject, is another appliance, differing somewhat in its purposes, but in action effecting valuable results; it is for the purpose of invigorating compounds that have become dull and insipid, by exposure, and restoring to them their pristine vigour. Champagne, ale, beer, and many other like compounds, are rendered, if left for any time exposed, extremely vapid and unpalatable. Nothing can be more unpleasant (as a draught) than these liquids, when they have become—to use a conventional phrase,—"dead." Let us inquire into the nature of these fluids,—we may

thus understand the reason of such properties; all bodies which are capable of undergoing fermentation, are found to contain certain organic compounds, capable of conversion into others, according to the nature, and the period of the fermentation,—thus the juice of the grape; the wort from which beer and ale are prepared, are found to contain a quantity of sugar, and it is this sugar undergoing decomposition that produces the phenomena of which we are speaking; the constituents of that substance, during the fermenting process, combine with the oxygen of the air,—carbonic acid is formed in large quantities, and given off into the atmosphere. The escaping gas gives rise to the peculiar appearance well known under such circumstances. The sugar, during this action, becomes converted into alcohol, and the presence of alcohol, and the intoxicating powers of these various drinks, are owing to the combinations and decompositions taking place during fermentation. The sharp, brisk character of bottled liquids is owing to the presence of carbonic acid; care is taken that these beverages are bottled in proper season, that the production of this gas may be continued after bottling, and the wine, ale, &c., thus become fully charged with the gas. Was the substance allowed to continue fermenting, exposed to the atmosphere, the whole of this gas would escape, and the liquid would be rendered perfectly unpalatable. The reason, therefore, why such fluids become "dead" when exposed, is because of the escape of the carbonic acid gas, and it is the replacement of such loss that the machine

in question is intended to effect. It has been already described in the preceding figures,—those apparatus serving to operate upon small quantities; when, however, it is required to act upon much larger portions, other kind of apparatus is employed. If we require to re-aërate some compound,—say a bottle of wine, beer, or some other fluid, we merely place it in the receiver of the machine, previously described, in lieu of the water, as there spoken of, and the process is soon completed,—the gas fully saturating the fluid, and restoring its pleasing and valuable qualities. The operation is as easily and effectually accomplished on a more extensive scale. The following imaginary case will render the understanding of this most simple:—We will suppose it is desired to re-aërate a cask of liquid,—be it beer, ale, or any other compound, that has lost its briskness by exposure, the following apparatus is made use of. It consists solely of a generator, having a pipe, the counter-part of that described in fig. 1. When about to be employed, the top of the generator, A, fig. 6, is removed, and the salts, as previously (only in larger proportions) introduced. The same action takes place in this as in the foregoing machine,—with this difference, that the gas, in escaping, descends the pipe, and aërates the contents of the cask or vessel, into which the pipe of the machine is fixed. The following sketch represents the apparatus fixed for use; B is the cask

Fig. 6.



of beer or ale, and A, the generator, screwed into the bung-hole, or any other orifice, made in the upper portion of the cask, to receive it; the pipe of the generator, it is here noticed, is made of sufficient length to reach to the bottom of the fluid. The salts employed in the foregoing machines are all of a pure and highly beneficial character; they may be procured at any chemist's, and at a most trifling cost,—one penny-worth being capable of preparing a pint of soda-water. In these contrivances, all inconveniences are removed; they require no additional aid to render their operations perfect, and when produced, the different beverages are worthy rivals for those of the most premier qualité now extant.

Fig. 7.



Another improvement, since carried out, and intended to remove any inconvenience resulting from the escape of the gas in the employment of the latter contrivance, is an entirely new bottle and stopper, to be made use of in connection with the preceding apparatus.

Fig. 8.

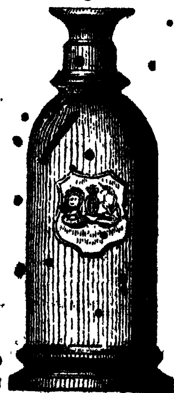


Fig. 8 represents the bottle alluded to above, fitted with the stopper, as described. The peculiarity will be readily understood from the following description:—The plug or stopper, manufactured of india-rubber, gutta-

percha, cork, &c., is fitted with a metallic casing, so contrived as to lock in the neck of the bottle (which is also prepared to receive it) when once inserted; —thus removing any chance of expulsion by the pressure from within. It is also arranged that the aërating apparatus previously described (fig. 6) may be inserted, by forcing the pointed pipe through the stopper to the bottom of the bottle, and aërating the contents, in a manner precisely similar to all former operations. When such aëration is complete, it is only necessary to withdraw the apparatus,—the cork remaining perfectly safe and secure against any escape of gas or fluid from within. The action is extremely simple; the elastic substance, when punctured, has a great tendency to return to its former position; the moment the opposing force (the tube) is removed, it does so, and in its return, is assisted by the pressure from within, which, the greater it may be, tends only to render the apparatus more secure.

Fig. 9.

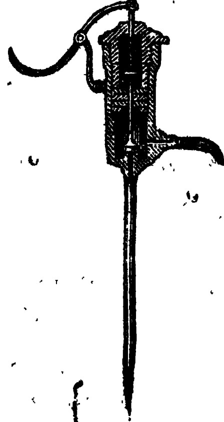


Fig 9 represents the tap to be used in withdrawing the fluid, after it is aërated.

I may mention, previously to concluding these observations, a fact noticed in connection with the operation of these machines, namely, that not only does the liquid become aërated, but greatly reduced in temperature, owing to the decomposition of the salts

made use of. When speaking of the laws of heat, we mentioned the fact that all matters passing from one condition to another more rarified, did so on account of acquiring a superior quantity of heat, and that condensation of all kinds produced an augmentation of temperature, it would seem, therefore, that in condensing the carbonic acid gas in the receivers of the various machines, there should be a large amount of heat given off; practice, however, has demonstrated to the contrary, and large masses of water may be frozen by the same operation as for the production of aërated fluids. I have, myself, frozen considerable blocks of ice by these means, and could, by properly arranging the apparatus, produce even greater results. The mere fact of the production of cold is easily seen by the vapour of water contained in the air becoming condensed, and forming a heavy dew upon the outer surface of the machine. The action and its effects, at first sight, seem paradoxical,—"the production of cold during condensation,"—and puzzled not only myself, but many friends to whom I mentioned the circumstance; upon properly considering the operation of the apparatus, and partly divesting our thoughts of the process of condensation, which had absorbed all other ideas, the matter was at once evident, that the most energetic and powerful action was that proceeding in the generator, where we find the peculiar conditions for the production of cold, matter passing to a more expanded condition, and under the most favourable circumstances from the

solid to the gaseous state; and in order to exist in such condition, a large amount of heat is required; this it obtains from the surrounding apparatus, and greatly reduces it in temperature. It would be foreign to our purpose to extend this matter further, the subject is one abounding in interesting topics, and the modes of appliance are so various, that it would occupy too much space to insert them here.

One other contrivance, somewhat an auxiliary to those above described, and we will dismiss them from our present attention, requesting an inspection at the Show-Room and Depôt, 309, Regent Street, where the various machines and their modes of operation are being constantly exhibited. We purpose, by the following contrivance, to enable parties to remove wines and other liquids from the bottles containing them, without extracting the cork. This most simple application will be at once understood.



It consists first of a cylinder, H, containing a piston, B, forming together a small force pump, by the action of which, air may be forced into the bottle when required; at the bottom of the cylinder is connected a double pipe, C, the inner tube of which passes to the bottom of the bottle, and is connected with the tap, D, the outer tube being a connection with the force pump cylinder and having no communication with the tap. The machine is so manufactured, that it may be introduced in the same manner as a

corkscrew, through the cork (as shown in the figure), if it be an aërated liquid, such as champagne; upon turning the tap, a requisite quantity may be immediately obtained, the confined gas forcing out the liquid through the inner tube, the remaining quantity in the bottle being left, will remain so for any length of time without injury; in other fluids, that have no such force contained above their surface to accomplish their exit, the use of this apparatus is peculiarly adapted; when the machine is inserted, an artificial power or elastic medium is produced by pumping in air by means of the small force pump placed above, when the wine, &c., may be immediately drawn off by the tap, D. The advantages are at once evident; by the use of this apparatus, a bottle of champagne or any other wine may be enjoyed by individuals day by day, it being in their power to withdraw any suitable quantity, without in the least degree injuring the taste or quality of that remaining, and thus small portions may be extracted until the whole is withdrawn, and, as before mentioned, without the removal of the cork. In the employment of the patent stopper and bottle the tap and pipe may be removed, as before explained, and the apparatus used for a succession of bottles.

There are other forms and modes of appliance embraced under the "Patent Aërated Water Machine;" these, however, are matters entirely of taste, and independent of any further arrangement for

their employment, or any different process for the generation of the gas.

In the aërated water apparatus, all manner of beverages may be prepared as previously mentioned, nor are we confined to such as are in common use, seltzer, spa, potash, chalybeate, alkaline, and all mineral waters can be successfully prepared in an artificial manner by this machine; for such desired end it is only necessary to employ powders, provided and sold for such machines by me. These are to be introduced into the receiver of the aërated water machine containing the water, and the aëration carried out as usual. For those who delight more in pleasant and delicious drinks, compounded of the choicest fruits, I would recommend my improved syrups, a small wine glass full of which placed in the tumbler, previous to the aërated water, is a most delicious and relishing draught. These may also be employed for the production of flavoured ices; their employment in this latter instance would require the assistance of one of my patent refrigerating machines. A wine glass full of syrup, as before, mixed with the same quantity of common spring water, as mentioned of aërated water above, and introduced in a freezing apparatus, would in a few minutes furnish a most delicious ice. There are several syrups, all of which may be procured at my establishment, such as—nectar, raspberry, lemon, ginger, &c., &c.

26, Wyndham-street,
Bryanston-square.

Dear Sir,—In the course of experiments I have conducted at various times with your patent aërated water machine, I have universally met with the utmost success, and willingly lend my recommendation, after such experience, to its introduction.

By its means, and your directions, I have been enabled to imitate, in the most perfect manner, natural waters, highly extolled for their salutary and medicinal virtues, also to concoct the most diversified and delicious beverages at present known and employed. The rapidity with which the necessary operation is completed, combined with the safety and easy management of your machine, will, I am sure, render its use universal. I may mention, that wherever I have introduced it, in illustration of points connected with popular chemistry, during my course of lectures in my professional engagements, I have invariably found its action most perfect, and I may add, in many instances, the source of much wonder and curiosity to those assembled.

I remain yours, &c., &c.,

EDWARD V. GARDNER,

Analytical and Consulting Chemist, late of the Royal Polytechnic Institution.

Mr. Masters.

THE IMPROVED

PATENT CULINARY UTENSILS.

It has for a long time been a desideratum to procure some contrivance by means of which the common culinary operations of every-day life might be carried on, without, as is now the case, the application of boiling water and an open fire heat to the materials in process of cooking, this procedure entailing the constant attendance of some experienced person, in order to check any too great amount of heat, and the deterioration of the matter in preparation.

These remarks apply even more particularly in those cases where it is desired to concoct some delicate confection, to which the smallest amount of heat over and above that required in its preparation, would prove at once injurious.

The actual contact of water during the process of cooking many vegetables, and other substances, tends in a great measure to destroy their peculiar

flavour and native richness, inasmuch as it is required, in order to obtain their perfect virtues, that the water already contained in the vegetable should be in some measure extracted from them, this water forming as it does, in many instances, an important item in their composition.

That valuable and important edible the potatoe, presenting in its constitution all the elements necessary to the well being and existance of man, contains as much as 78 per cent. of water, and although the difference of the amount of this compound, existing in a cooked and raw potatoe is very trifling, yet, in many instances, indeed in almost all, it is impossible to retain the aroma and flavour of a potatoe in the ordinary process of cooking. The "mealy" character presented by a well cooked potatoe, so much esteemed by epicures, is especially noticed in potatoes not cooked by boiling in water, but by the process of steaming. The contact of water is not, as previously stated, essentially necessary to the mere process of cooking,—heat is the principle agent, and potatoes cooked by heat alone, it may be remembered, are possessed of more aroma and flavour, and present the "mealy" appearance in a much greater degree than when the same are boiled in contact with water. A potatoe, when cooked, presents to the eye, under a powerful microscope, an appearance of gelatinization, the granules of starch having swelled from the absorption of cellular water, and burst the confining cells asunder. To cause the gelatinization of starch, an amount of

heat is necessary, equal to about 150° Fah., whether this heat be communicated by boiling water or otherwise, a precisely similar effect follows; in the former instance, however, the matter is exposed to the solving influence of the water, and any soluble portions become extracted. We may here remark, that the flavour of the potatoe is dependant upon the presence of a peculiar principle termed "potateine;" this principle is soluble in water, may it not therefore be owing to the extraction of this "potateine" during boiling that the potatoe looses so much of its "epicurian richness."

In making many conserves, it is absolutely necessary that the heat should be regulated for a great length of time, and care taken that no increase beyond such set point be gained, or otherwise the compound in process of preparation is entirely spoilt. The consummation of this end is always a difficult and tedious task, and cannot, however carefully undertaken, be at all times successfully carried out. I have constructed a number of utensils, to overcome the difficulties to which we have adverted. They are, as will be seen from a perusal of the descriptions annexed, extremely simple, and well calculated for all the purposes desired as well as being very portable and economical.

Fig. 1 represents a saucepan, in which the articles are cooked by steam, and also by the external application of hot water to the inner vessel. In this saucepan or vessel there are two casings, an inner and an outer casing; the outer one being

filled with water at the plug, *a*, which acts as a safety valve; for this purpose I surround it with vulcanized india-rubber, which ensures a uniform amount of elasticity; this, however, would only be requisite where the cover is fitted closely, and secured down. These remarks will also be applicable to the other vessels herein described. The water being filled to the height of the plug, *a*, encircles the inner vessel, *b*, *b*, heating it by contact; and when steam is evolved, it descends through a channel or channels on the extension of *b*, and entering at the bottom of which, it ascends through, and assists in cooking the articles contained in the inner vessel, which is furnished with a double bottom, the lower one being for the purpose of receiving the condensed water, and thereby keeping the article under operation dry, and also as a receptacle for any water that may boil over. A perforated tray, *d*, is also shown here in addition to the bottom, *e*.

Fig. 1.

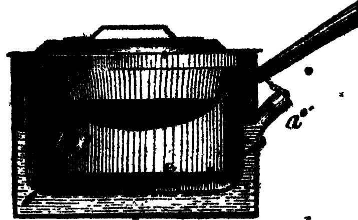


Fig. 2 represents a saucepan, constructed with a double casing, but having in addition an arrangement for catching or preventing the return of the condensed water on the articles under operation, as before the vapour enters the inner vessel by the pipes, *c*, *c*, and passing upwards condenses on the underside of the cover, which should be of such an

inclination as to cause the condensed water to adhere to, and trickle down, the underside towards the circumference, where it is received in a return lip or collector, *g*, which has at one end a conical spout, *h*, into which the whole is collected; this conical spout fits into the top of a pipe, *i*, by which it is conveyed below the level of the water in the outer vessel. The conical spout, *h*, should be fitted so as to prevent any egress of steam in that direction. By this arrangement, the dropping or depositing of condensed water on the articles under operation is prevented, which is ofttimes very detrimental.

Fig. 2.

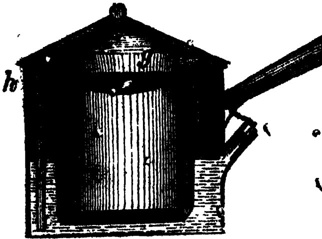


Fig 3 represents a fish-kettle, in which the descending pipes, *c*, *c*, are employed to convey the steam below a perforated bottom, *d*, in addition to the strainer, in order that the steam may have equal effect over the entire area of the kettle, and thereby ensure a uniform degree of cooking to the whole contents.

Fig. 3.

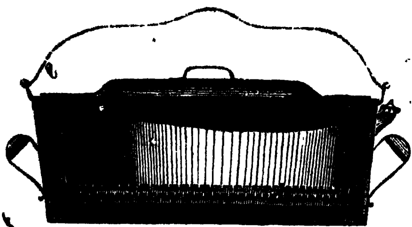
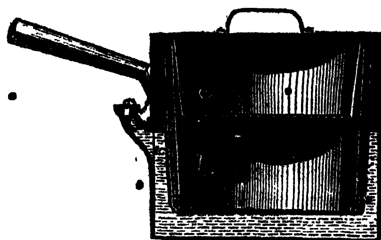


Fig. 4 represents a sauce or stewpan, having a water compartment, with descending steam pipes,

c, from which the steam issues into the inner vessel, *d*; a third vessel, *e*, is placed within the casing, *d*, and which may be of greater or less depth, having the sides and bottom exposed to the action of the steam. The vessel, *d*, should be furnished with a safety valve escape aperture, to regulate the temperature required. The contents of the vessel, *e*, may thus have a uniform degree of heat ensured for their preparation.

Fig. 4.



I also further propose to remedy the unpleasant character acquired by some compounds when allowed to remain in contact with the metal of which the cooking utensil may be constructed. This difficulty I have encountered, and removed by employing an inner vessel, made of porcelain, for containing the materials in process of preparation, or those already prepared. The apparatus may be described as follows:—

Fig. 5 represents a culinary utensil or saucepan, in which the improvement consists in the employment of a lining of porcelain, earthenware, or other similar substance, in order to obviate metallic contact with the contents. I am aware that a material usually denominated porcelain has heretofore been employed as an inner coating to culinary utensils,

but which is incorporated with, or made to adhere to, the vessel to which it is applied, and is only applicable to particular ware. The heat to which these utensils are subjected, causes the expansion of the materials, which however being in unequal proportion, is detrimental to the lining. To obviate this I form a separate vessel; *a*, is the lining of porcelain or similar substance, encased in tin plate, copper, or other metal suitable for the exterior, *b*; a saucepan of this description is at once durable and inexpensive, and at the same time possesses all the advantages manifest in the permanent lining; these utensils are also capable of being readily repaired. To allow the escape of air, I insert a small tube between the two vessels.

Fig 5.

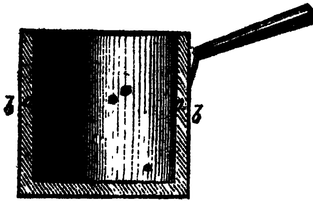
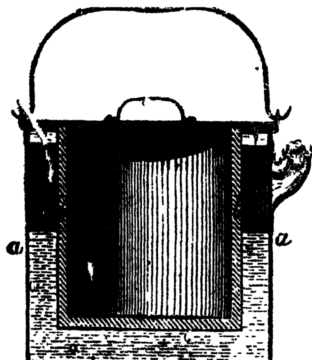


Fig. 6 represents a vessel termed a stock-pot, being for containing soups, in order to preserve them in a heated state, or otherwise, without the liability of injuring them. It consists of a double vessel, *a*, *b*, the outer one, *a*, being of metal, and the inner of porcelain or other analogous material, hot water being introduced in the space between the two vessels,

Fig. 6.



at the plugged aperture, will retain the heat for a great length of time, and, if necessary, the vessel may be placed on the fire, without fear of injury to the contents.

Fig. 7 represents a vessel known as a biscuit-pan, but which has hitherto consisted only of a single vessel. It is used for the purpose of beating up or whisking batters. This improved pan is formed either of metal or earthenware, inclosed within an exterior vessel, furnished with a plugged aperture, for the introduction of hot water, by which the requisite heat may be obtained, or, if desired, it may be placed on the fire without danger to the contents.

Fig. 7.

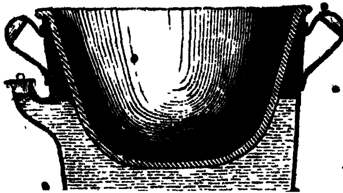
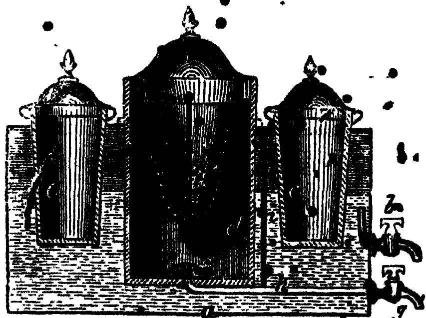


Fig. 8 represents an apparatus for containing soups, and preparing coffee on a more extensive scale; *a*, is an internal chamber for containing water, and is suitable for the application of heat thereto, so that it may be retained at the boiling point, or any less degree of heat, the water being drawn off to a suitable height by the tap, *b*.

Fig. 8.

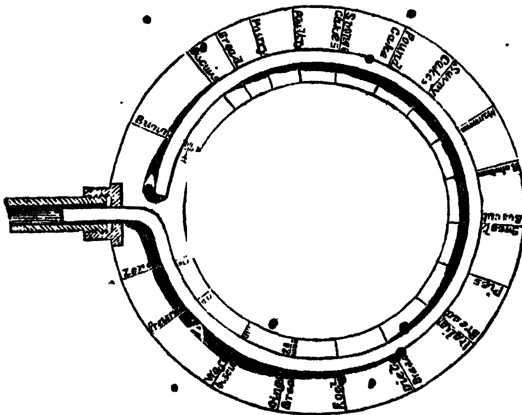


The two side vessels, *c*, *c*, are receptacles for containing soups, formed of porcelain, in order to preserve the contents for any length of time without such injury as would result from metallic contact. The centre vessel, *d*, is for the infusion or decoction of coffee. This vessel is also formed of porcelain, or similar material, in order to prevent any injurious effect from the retention of the decoction of coffee within it. In preparing coffee with this apparatus, it is placed within the double strainer, *e*, and boiling water poured upon it, the extract being further enhanced by the heat applied externally to *d*. The decoction of the coffee passing through the double strainer, *e*, is received in the vessel, *d*, where it is retained until required. A third strainer, *f*, is placed in the bottom of *d*, through which the coffee is passed when being drawn off; the percolation through this strainer is slow, on account of its passing through a cloth or woven fabric. The interior of the strainer, *f*, is therefore of such dimensions as will contain the requisite amount required at one time. The coffee thus prepared is drawn off by the tap, *g*, in communication with the strainer, *f*, by a pipe, *h*. In order that the contents of the strainer may be readily drawn off, an air supply pipe, *i*, is provided, for the admission of air to the pipe, *h*, and strainer, *f*, rendering the withdrawal independent of the further percolation of the coffee from the bulk, which proceeds slowly after the space has been vacated,—the air escaping from thence as it entered.

Upon a more extensive scale, where it is necessary that a greater number of materials be cooked in the same atmosphere, requiring, many of them, different amounts of heat,—such as in ovens, &c.,—I have an apparatus or index, to be affixed to the oven. Its operation is as follows:—

Fig. 9 represents an improved indicator, applicable to ovens, for the purpose of indicating when to introduce different articles in cooking. It consists simply of a scale, graduated so as to indicate the proper temperature for each particular purpose that

Fig. 9.



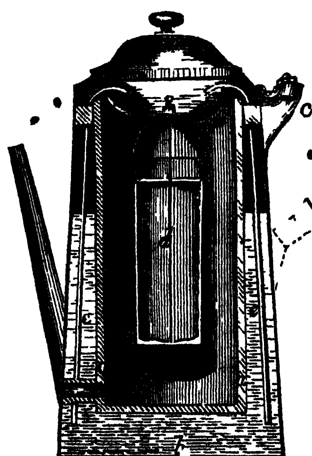
may be required; *a*, is a glass tube, hermetically sealed, and containing mercury, which may be placed in any convenient or conspicuous position, and connected with a metal tube, *c*, containing mercury, proceeding from the interior of the oven,—the expansion of the mercury, from heat, causing it to rise. The scale, *f*, is graduated, as will be seen, with apples, tarts, confectionary, meats, poultry,

&c., &c., indicating when such should be introduced, and the temperature retained during their stay in the oven. These different graduations are arranged on the outer circle, while the time to remain is indicated by the inner circle. Other means may be resorted to, for indicating the heat in connection with this scale, as in the pyrometer, or by the expansion of mercury in a tube, having a float, actuating a hand, as in the wheel barometer.

The second department under this head comprises a few modifications of an apparatus to prepare an infusion of coffee, without the trouble and inconvenience attendant upon the usual proceeding. Many improvements have of late years been effected in utensils for the preparation of this beverage, and for remedying the employment of fish-skin, egg, &c., in clarification; the use of which is most objectionable,—for although such materials effectually clarify, yet such clearness is purchased at the expense of the strength and virtue of the compound. The great improvement, as yet adopted, has been generally dependant upon filtration,—but in almost all such improvements, the filter requires so much time to effect its object, that the beverage becomes much reduced in temperature, and therefore very insipid, and unpleasant to the palate. It has been ascertained also that the best and most perfect manner of preparing coffee is by infusion, and *immediate percolation*,—and that boiling this beverage tends to destroy its nutritive and invigorating qualities. From these premises we should consider

that apparatus in which the hot water could be brought into contact with the coffee, and the infusion filtered at the same time, as the most efficient. Considering myself in like manner, I have constructed an apparatus fulfilling all these purposes, which, in some of its modifications, I will now describe.

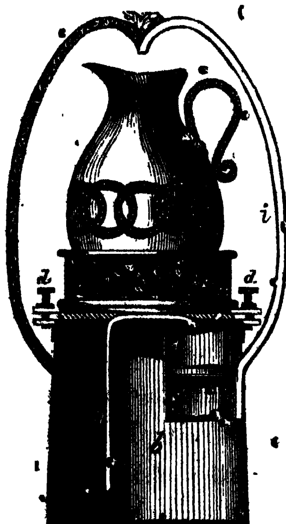
Fig. 10 represents a coffee-pot, or vessel for the infusion of coffee. It consists of an interior chamber, formed of porcelain, or other similar substance; this is fitted to the interior of a metallic vessel, b, having a space of greater cubical content than the vessel, a. Water is introduced to this vessel at the plugged passage, c, which, as before mentioned, with reference to cooking utensils, acts as a safety valve. The coffee to be infused is placed within the bag filter and strainer, d. On the boiling of the water, consequent on the external application of heat, the steam generated presses on the water between the vessels, a and b, causing its ascent up the tubes, e, e, and to be ejected on the perforated cover of the strainer, d, through which it descends, passing through the coffee into the vessel, a; when



the filtration is complete, the strainer, *d*, is removed. The decoction will be kept hot by the external water, which will also facilitate the better extraction of the coffee. Coffee may remain in this vessel for a length of time without detriment thereto, and may be re-heated through the medium of the surrounding water, which, however, will, in most cases, retain its heat for the time required.

Fig. 11 represents another arrangement of apparatus, for the ready production of decoctions of coffee. In this case it consists of a double chamber,—one, *a*, for receiving the coffee to be infused, and the other, *b*, the water. Both these vessels are securely attached, having their upper surfaces in the same plane, for the purpose of fitting the cover, *c*, so as to enclose both, and effectually separate one from the other, at the same time,—which is effected by screwing it down, by the thumb-bolts, *d*, *d*, and interposing a thickness of vulcanized india-rubber between the cover and its points of contact. The cover, *c*, is furnished with a suitable stand, for holding a jug, or other receiver of the infusion. The coffee, on being introduced to the chamber, *c*, is retained by a bag filter, *f*, fitted by its supporting

Fig. 11.



ring to the vessel, *c*, so as to prevent the passage of water otherwise than through the filter. The whole apparatus having been secured, as shown, with the requisite quantity of water and coffee in their respective vessels, steam is generated by the application of a spirit lamp or other heat to the bottom of *b*, which causes the water to rise in the pipe, *h*, and thence descending on the coffee in the filter, passing through which, the decoction rises up the pipe, *i*, and is conveyed into the jug placed for its reception, as shown, which may be removed and replenished at pleasure.

Fig. 12 represents a vessel for the infusion of coffee in large quantities. It consists of a double vessel, *a* and *b*, as before, the inner being of porcelain or other analogous substance. Coffee is prepared by placing it within the double strainer, *c*, and having boiling water poured upon it, the decoction is further strained through the cloth strainer, *d*, adapted for the reception of the quantity that may be required at one time, as before explained, with reference to

Fig. 12.

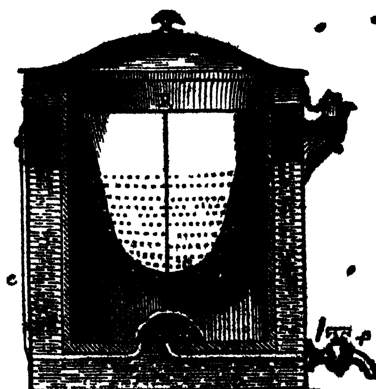
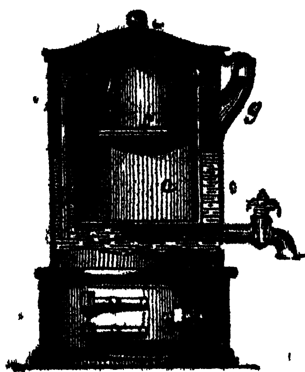


fig. 10, and like that furnished with an air tube, *e*, the infusion being drawn off at the tap, *f*. The coffee is retained at a uniform temperature by the

water in the space between the casings, which is again subjected to the action of a hot plate or some equivalent therefor. The internal strainer, c, being removed, the infusion of coffee may be kept hot without being subject to the injurious effects arising from the use of metal vessels, or from burning, by the direct application of heat to the vessel containing the coffee.

Fig. 13 represents another arrangement of apparatus for the infusion of coffee, furnished with the inner porcelain vessel, *a*, in which the depository, *b*, for the coffee is supported from a single arm, *c*, forming the tube for the passage of the boiling water. This tube has a conical piece, *d*, fitted to a corresponding seat in the top of the vertical conduit pipe, *e*. The depository, *b*, is furnished with the usual strainer, *f*, and has its cover fitting moderately tight, so that the pressure of the steam in the outer vessel causes the water (as before explained) to pass up the tube, from thence through the coffee in the vessel, *b*. The infusion passing through the strainer, *f*, is deposited in the porcelain vessel, *a*. The vessel may now be removed from the interior by simply raising the conical part, *d*, from its seat, that being

Fig. 13.



the only point of connection. The water in the outer vessel in this, as well as the other coffee pots, should be placed at such a height that the required quantity may pass over when it has fallen to the lower end of the pipe, *e*, as below which the flow will cease; should any subsequent addition be required, more water should be introduced at the plug, *g*, and again caused to boil; or instead of depending on the amount of water in the outer vessel containing a superabundant supply, and stopping the passage up the tube, *e*, by opening the plug, *g*, a stop-cock may be applied for the purpose, by which the steam generated may escape, without effecting any pressure on the surface of the water. The apparatus shown at fig. 17 is represented mounted on a stand for the application of a spirit lamp, or other heating apparatus.

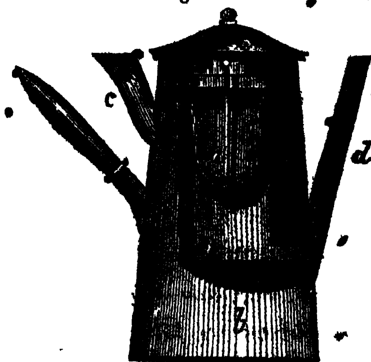


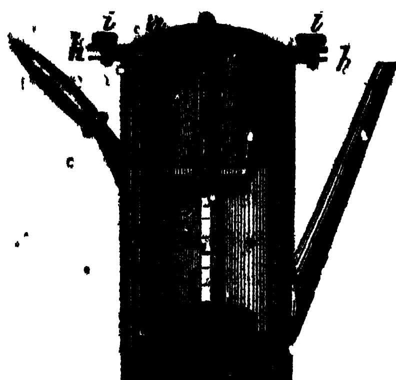
Fig 14

Fig. 14 represents an arrangement of apparatus on the principle of heating by means of the hot water chamber. The coffee is infused in this apparatus by pouring water on the coffee placed in the strainers or filters, *a*, while the heat is maintained or increased by means of the water in the surrounding space, *b*. Two spouts, *c* and *d*, are fitted one to each vessel, by which arrangement either hot

water or an infusion of coffee may be obtained; *c*, being in connection with the hot water, and *d*, with the porcelain vessel containing the infusion.

Fig. 15 represents an arrangement of apparatus in which the vessel for containing the coffee is attached to the cover and removed with it. The cover, *a*, has a hollow crown connected with the ascending pipe, *b*, by the channel, *c*; the crown has a perforated distributor, *d*, with a tubular stud, for securing the filter, *e*, which is drawn up against a washer of vulcanized india-rubber, *f*, of the screw-nut, *g*; the close fitting of the cover, and the junction of the pipe, *b*, and channel, *c*, are also ensured by the same thickness of rubber, the whole being on the same plane; the cover is secured by the lugs, *h*, *h*, and binding screws, *i*, *i*. The coffee to be infused is placed in the filter, *e*, which is screwed up to the cover described, and the whole secured in its position. The action of this apparatus is similar to those already specified, and will not, therefore, require further description." This apparatus, which is applicable for the infusion of large quantities of coffee, has attached to it an indicator, for the purpose of showing the contents of the inner vessel at any given

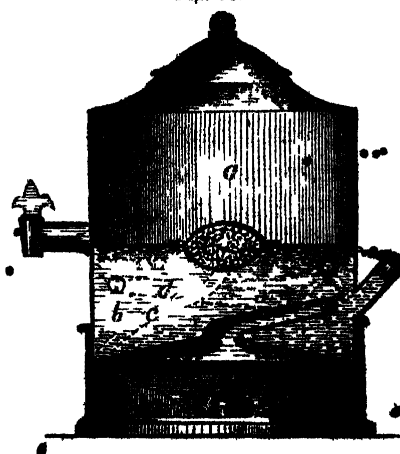
Fig. 15.



point; this indicator consists of a float, *k*, with a stem, *l*, passing through the cover, which stem is graduated, to show the number of cups of coffee remaining in the vessel, which will be indicated by the height it stands above the cover, the stem, *l*, being loosely fitted to the aperture through the cover, in order to permit of its free movement, and also for the escape of air from the inner vessel. The float, *k*, should be of porcelain or other material unaffected by the infusion, as it always remains partially immersed therein.

Fig. 16 represents an apparatus for filtering and heating water or any liquid, and is intended for the purposes of an urn. It is divided into two compartments, *a* and *b*, having a communication by means of a tube, *c*, carried down towards the bottom of *b*; the upper part of this pipe terminates in a chamber containing sponge, or some other filtering material, *e*. The lower chamber, *b*, is formed with a conical bottom, from the apex of which a worm or spiral channel, *d*, is conducted, and passes out at the side; the heat evolved from the spirit lamp is thus conducted through the body of the water, exposing

Fig. 16.



a greater or less extended surface, according to the length of the pipe, *d*. On the boiling of the water, the steam generated pressing on the surface of the water (the chamber being filled at the elastic plug aperture), causes it to ascend the pipe, *c*. The water being thus partly purified by leaving the deposit resulting from boiling in the chamber, *b*, is further purified by passing through the filtering substance, *e*. The water will be retained in the upper vessel, *a*, so long as heat be applied to the bottom of the chamber, *b*; but when allowed to cool, it descends to the vessel, *b*, until heat be again applied. The lower chamber should be furnished with a stop-cock, for the purpose of regulating the escape of steam; or it may be allowed to pass up the pipe, *a*, when the water has fallen to the lowest point, by which arrangement it will pass through the water in the upper chamber, and out at the cover.

In all these different culinary apparatus great superiority is gained over any other contrivance; it will be noticed, upon observation, that the parts re so disposed as to present a large amount of heating surface to the fire, at the same time that the water contained exposed to such heating surface is nowhere of greater body than is absolutely necessary; by these means, the water may soon be brought to the boiling point, and the various articles cooked in a much less space of time than in the ordinary process.

Thus, a potatoe cooked by the most improved means at present before the public, will require

at least thirty minutes; whereas, in the use of the preceding utensil, only half that time is necessary. Neither do these considerations embody all the conveniences enjoyed in the use of this improvement. The apparatus is also adapted to the preservation of the articles after being cooked for some considerable period; being immersed in a bath of hot water, they retain the temperature of the same so long as it may be kept up, and being also preserved from contact with metal, they may be suffered to cool, and again re-heated for consumption when desired, which proceeding, with the common cooking vessels now employed, would tend to injure their contents.

We must consider, also, that not only is a saving of time effected, but also a large amount of fuel; these facts point at once to the greater economy of such utensils, either in point of time or money.

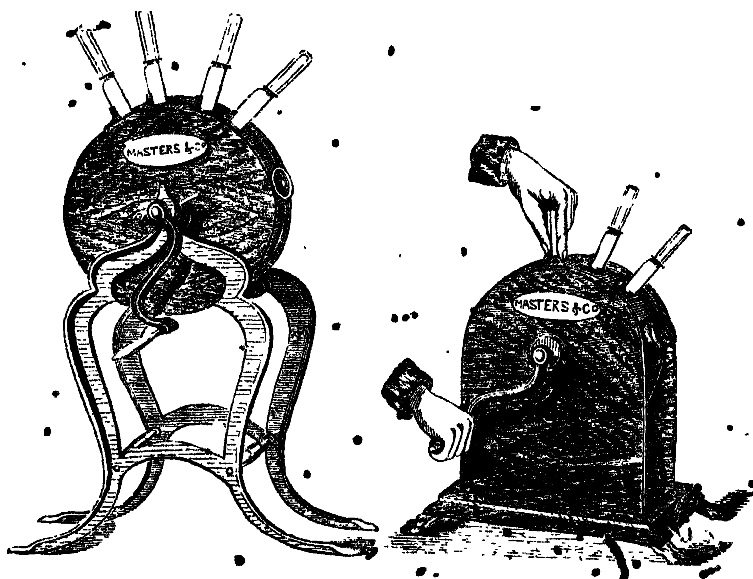
THE IMPROVED

PATENT ROTARY KNIFE CLEANER.

There are many plans existing for the manufacture of knife-cleaners, after a patented manner, peculiar to each individual; these, in some instances, have become entirely obsolete,—while in others still employed, we find great defects existing. In all other machines we find a spindle or shaft, occupying the centre upon which the brushes revolve, the presence of such, as can be easily conjectured, would seriously injure the knife, if carelessly inserted in such a machine,—or at least tend to remove the cutting edge, should they, in process of cleaning, be brought in contact with the metal spindle.

Remarks having appeared in public relative to certain machines resembling those embraced by my patent, I would beg most particularly to direct the reader's attention to the main and important differences between those constructed under the original American patent, and those manufactured upon the new and improved principle of "Masters's Patent Rotary Knife Cleaner." The interior of the new

patent improved apparatus is constructed of elastic buff leather, so contrived as to be always in close contact with the knives, and being self-adjusting, requires no attention to its management. The presence of a spindle, occupying the centre of the drum, and therefore most useful portion of such an apparatus, is entirely superseded, and all inconveniences resulting therefrom removed. Knives may, in consequence, be cleaned through their



whole length at one operation, in a small machine, a plan impossible to all former machines, unless very largely constructed, because of the interference of the centre shaft or spindle. Knives may be cleaned, and brilliantly polished, equal to new, in an incredibly short space of time. During the

process, the operator has not to suffer the usual inconvenience of dust and noise, usually an accompaniment thereto; and not the least desideratum is the preservation of the ivory handles of the cutlery, which have hitherto been used, to become discoloured and injured by the warmth and dirt of the hand. The machines being of an ornamental character, can be placed as part of the furniture of any room, without seeming conspicuous or misplaced. It has been found more convenient to make these machines of a size capable of perfect management by any person, and to remove the large amount of labour required where the surface becomes largely extended, and the pressure therefrom accumulated so as to require considerable power to work the machine. From experiments on this point, I have found the most convenient and expeditious machine is that capable of containing and cleaning at one time four knives. In this, the rapidity and ease of the operation more than compensate, and the work becomes far more easy than in the employment of a machine capable of cleaning a larger quantity. By such a machine as here alluded to, twelve knives can be cleaned in the most perfect manner in one minute, without the requirement of any large amount of labour or exertion. On the other hand, a machine capable of holding twelve knives would require much power to perform its duties in the same time, and then probably with less success than with a smaller machine.

LIST OF TESTIMONIALS.

I have great pleasure in referring to the following Testimonials, being a few selected from many thousands, from different countries, all bearing evidence of the efficacy and perfect success of my Machines and Apparatus.

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.. Rutland
.. Stacpoole
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Marquis of Donegal
.. Douglas
.. Ormonde
.. Waterford
.. Winchester
The Earl of Abergavenny
.. Caledon
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Asnaboldi,	..	Adam,	..	D. Coloquhoun,	..

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J. Everett,	..
Wm. Everett,	..
Dent,	..
J. Gray,	..
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Malcalm,	..
G. Fitzwilliam,	..
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W. B. Simpson,	..
Campbell,	..
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C. Bevon,	..
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West,	..
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Patrick,	..
T. J. Bell,	..
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Brooks,	..
Franklin,	..
W. H. Stanton,	..
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R. D. Cough,	..
S. P. Gilbert,	..
Gerald,	..
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Sands,	..
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Geo. Walker,	..
Price,	..
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Chas Hardy,	..
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H. Collison,	..
Berger,	..
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E. Leslie,	..
A. Grant,	..
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J. Gray,	..
Struve,	..
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Morrison,	..
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Fitzgerald,	..
Hodchkiss,	..
Humphries,	..
Tabor,	..
Mc Clean,	..
Owen,	..
Sanderman,	..
Crockford,	Miss
Robson,	

CLUBS & HOTELS.

Junior United Service Club.
Carlton Club.
Conservative Club.
Parthenon Club
Thatched House Tavern.
Peel's Coffee House.
European Hotel, City.
Long's Hotel.
Cremorne Gardens.
Salisbury Dining Rooms.
Grecian Dining Rooms.
Leverett's Dining Rooms.
Owen's Dining Rooms.
European Hotel, Coventry-street.
King's Arms, Hampton Court.
Castle Hotel, Richmond.
Nag's Head, New Cavendish-street.
Euston Hotel.
Evans's Hotel.
Castle Hotel, Windsor.
Wood's Hotel.
Ship Hotel, Crediton, Devon.
White Hart, Reigate
Laker's Railway Hotel, Reigate.
White Hart, Lewes.
Bell Inn, Maidstone.
Star Hotel, Maidstone.
New Inn, Maidstone.
Swan Hotel, Hastings.
Castle Hotel, Tunbridge Wells
Marine Hotel, Worthing.
Three Cups Inn, Harwich.
&c., &c., &c.

MASTERS *v.* KENT.

To my Readers and Patrons,

Ere this, many may, perhaps, have met with advertisements relating to Knife Cleaning Machines, and containing some very pertinent remarks in relation to those which I have placed before the public. Acquainted, perhaps, with the fact of myself and Mr. Kent each having such machines for disposal, in outward appearance closely resembling each other, it has, doubtless, occurred to many which of the two has the right of manufacture? And which indeed of these Machines is to be preferred? An advertisement has been going the round of the papers, tending by its import and unjust insinuations to injure the character of those Machines manufactured by me, which wrong has led me thus, in self-defence, to explain the whole matter, and unmask the working of false accusations.

The Machines of both manufacturers are the invention of an American, and were introduced from that country to this, in which a patent right was secured, the division of interest being, that I should manufacture Machines under five knives, while Mr. Kent should confine himself to the manufacture of all larger Machines,—that is, for five, and more than five knives. The patent proceeded thus jointly, until

Mr. Kent took offence at my constructing Machines of a diameter similar to his, although only for cleaning four knives, according to our agreement. Proceedings were instituted, tending to remove all interchange of mutual interest, which ultimately terminated in my favour. I am sorry to find the evidences of dissatisfaction and ill-feeling venting themselves in a manner—to say the least—ungentlemanly and unjust. In securing for myself the exclusive right of making the small Machines, I likewise made an improvement upon them, which I have since patented in many countries. By this I am enabled to secure an improvement perfecting the use of these Machines, without the employment of a centre shaft or axis through the drum,—in this point differing in my arrangement from all other Machines, which can only be manufactured with a centre spindle.

Having thus briefly related the ungarnished statement of facts connected with this business, I trust I may be excused for thus courting the fair and unbiassed judgment of the British public, to whom I am already so much indebted.

THOMAS MASTERS,

PATENTEE OF SODA WATER MACHINES, ICE MACHINES,

&c., &c., &c.,

309, REGENT STREET, & 333 OXFORD STREET.

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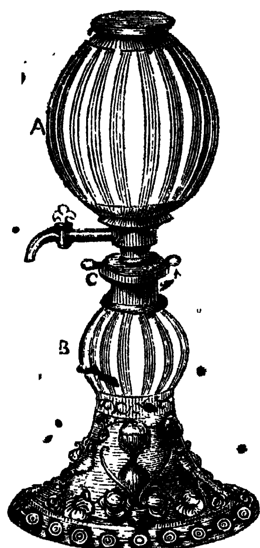


Fig. 1.

Fig. 2.

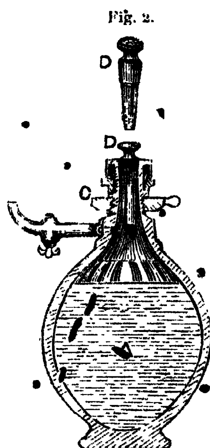


Fig. 3.

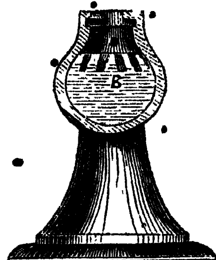


Fig. 4.

DIRECTIONS

For the Employment of Masters and Co.'s Patent Ærated Water Machines.

First.—Unscrew the flange, C, fig. 1, in the direction of the arrow inscribed thereon. By means of the tap turn the receiver, A, to the stop, in the direction of the arrow, as before. Now disconnect the two apparatus by lifting off the receiver, A, from the generator, B.

Second.—Remove the plug, D, figs. 2 and 3, and fill the receiver, A, quite full of water, and pour from the same sufficient to about half fill the generator, B, fig. 4, and replace the stopper, D, firmly in its position.

Third.—By means of a funnel, place in the generator, B, a measure of bicarbonate of soda, and a measure (the larger of the two) of tartaric acid, in small crystals. Quickly replace the receiver, A, in its former position; lock the two vessels together by a reverse motion to that employed in the disconnection of the apparatus, and screw the flange, C, once more to its place.

Fig. 1.



SECOND FORM OF APPARATUS.

First.—Unscrew the flange, C, fig. 1, in the direction of the arrow inscribed upon it. By means of the tap turn the plug connection to the stop in the

direction of the arrow, as before, and remove the top and plug from the apparatus, figs. 2 and 3.

Second.—By means of a funnel, fill the receiver, A, quite full of water, and pour from the same a sufficient quantity to about half fill the generator, B.

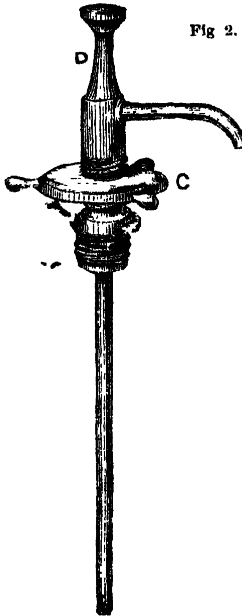


Fig 2.

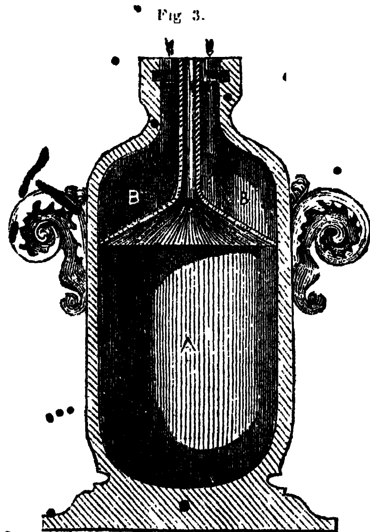


Fig 3.

Third.—By the aid of a funnel, place in the generator, B, a measure of bicarbonate of soda, and a measure (the larger of the two) of tartaric acid,—the latter in small crystals. Replace and fix the plug and tap, C and D, fig. 2, quickly in its former position with A and B. Lock the two apparatus together by a reverse motion to that employed in disconnecting the apparatus, and screw the flange, C, once more to its place. The process of aëration immediately commences.

THIRD FORM OF APPARATUS.

First.—Unscrew the flange, C, fig. 1, in the direction of the arrow inscribed thereon. By means of the tap, &c., turn the generator, B, to the stop in the direction of the arrow, as before. Now disconnect the two apparatus by lifting the generator, B, out from the receiver, A; figs. 2 and 3.

Fig. 1

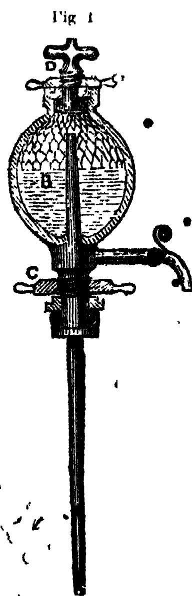
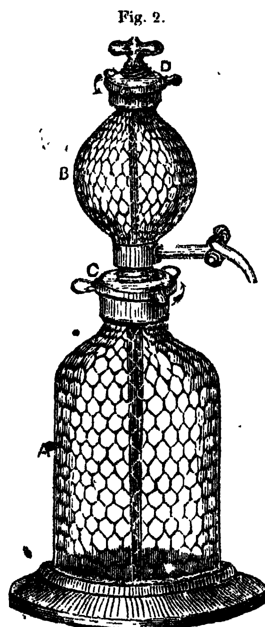


Fig. 2.



Second.—Fill the receiver, A, quite full of water; pour out of A, into some convenient vessel, sufficient to half fill B. Replace the generator, B, and secure it by means of the flange, &c., in its previous position.

Third.—Remove the plug, D, from the generator, B, in a like manner to disconnecting A and B. Place the water reserved in filling the receiver into B, or



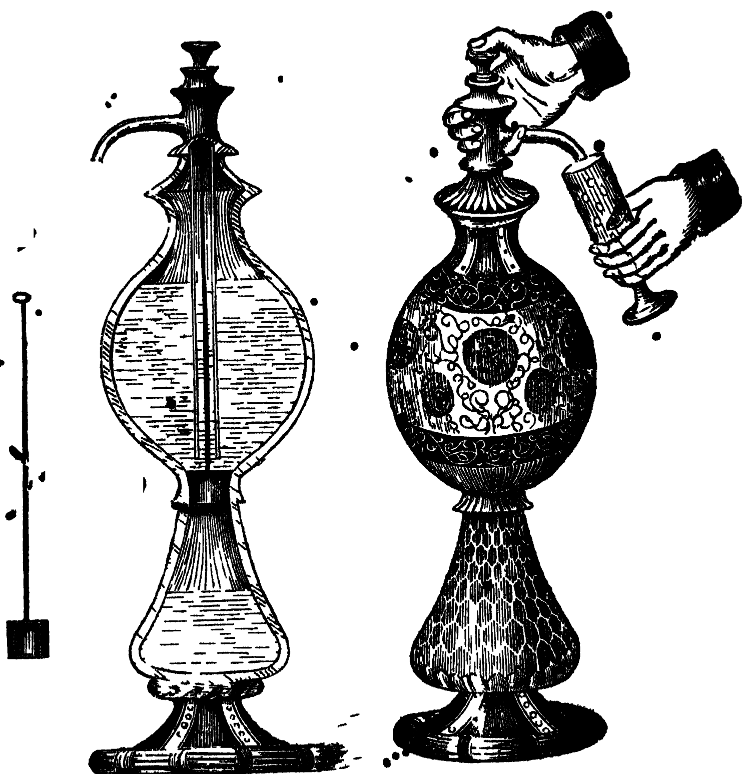
Fig. 3.

about sufficient to half fill it. Introduce, by means of a funnel, one measure of bicarbonate of soda, and one measure (the larger of the two) of tartaric acid, —the latter in small crystals. Replace the plug, D. securely, as before, and the operation of charging is completed.

Remarks.—It must be particularly observed, that the soda be placed in the generator previous to the acid, and that the latter be in small crystals, and free from dust. Twenty or thirty minutes is in general sufficient time for the full aëration; the more time given, however, and the cooler the water, the greater

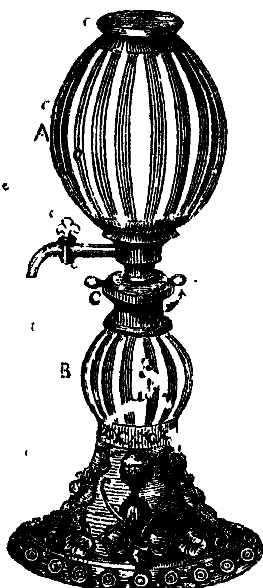
perfection is acquired. To produce "soda water," it is only necessary to add to the water to be aërated, a few grains of soda, according to palate. For the production of other mineral and alkaline waters, the water in the receiver must be mixed with the relative powder for the production of each. To improve the aërated or soda water to suit some palates, a small quantity of brandy, cherry brandy, nectar, liqueur, port or sherry wines, orange, ginger, syrups, &c., as described in my work, may be added,—the quantity being, of course, regulated according to taste, the compounds employed being placed in the glass previous to the aërated water being withdrawn, or a proportionate quantity may be put into the machine and aërated at once. A small portion of syrup, made from sugar candy, &c., will be found a great improvement when mixed with wines, &c. In the aëration of wines, &c., room must be left in the receiver for the entrance of the gas,—taking as much less wine, ale, &c., as water poured from the receiver in the above apparatus,—*water being used to dissolve the salts in the generator,* B, *as usual.* The generator must be carefully cleansed previous to re-charging the machine, otherwise an overflow will take place.

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No 1

Unscrew the flange, turn the tap round, and then withdraw it; pull out the plug or gas generator, then place in the funnel,—through which pass a measure of bicarbonate of soda, and one of tartaric acid, in small crystals; remove the funnel, and replace the plug; fill the upper part of the apparatus with spring water, then lift up the plug about an inch for a few seconds, to allow sufficient water to pass from the upper to the lower part, as shown, taking care to replace the plug firmly, then place the tap in its former position.



No. 2.

The directions for charging this apparatus are precisely the same as No. 1.

If wine, lemonade, nectar, ginger beer, ale, &c. is required to be impregnated, pass a little water through the funnel into the lower part instead of lifting up the plug, taking care that the liquid to be aërated does not quite fill the vessel (*as shown in section.*)

Syrups of every description, for flavouring these beverages, or making dessert ices, can be had of the patentee.

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